

The Chemical Age

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Notes and Comments

Inspection of Explosives

THE annual report of His Majesty's Inspectors of Explosives, to which extended reference is made in other pages, is not merely a bare record of the working of the various Acts and Regulations, but is written with the object of interesting not only the explosive and petroleum industries, but local authorities and, in certain respects, the general public. In regard to local authorities which are responsible for the licensing and local administration generally of the Explosives and Petroleum Acts, the report contains records of accidents and experiences in keeping, conveying and handling explosives, petroleum spirit and certain other dangerous articles—records collected not only from this country but from the Dominions and certain foreign countries. It is the only record of its kind and is without doubt the readiest means of maintaining an up-to-date knowledge of these matters. It is difficult to see how an authority charged with the administration of the Acts can be sure of doing so to the best advantage to the general public without taking notice of the experience recorded in such reports. The report this year is divided into three parts, dealing respectively with explosives, petroleum, and miscellaneous subjects, and special attention is drawn to the continued danger associated with the preservation of war trophies owing to lack of knowledge of their nature.

There is a touch of sentiment in the reference to the closing down of the old gunpowder mills at Faversham (described in THE CHEMICAL AGE twelve months ago). The concentration of explosives manufacture in one centre, which on economic grounds was found necessary, involves a break in a long historical association. Gunpowder has been made at Faversham ever since the days of Queen Elizabeth, if not before, until the name of Faversham has come to be almost synonymous with gunpowder. In 1760 what afterwards came to be known as the Home Works were conveyed to Charles Duke of Marlborough, Master General of the Ordnance and the factory remained the Royal Gunpowder Factory until after the peace of 1815, when the Government thought it desirable to remove the royal factory from Faversham, its proximity to the sea being supposed to render it an easy prey to an invading force. The manufacture was therefore transferred to Waltham Abbey, which was already a royal factory, and Faversham was leased by the Government and afterwards sold. In much later years the Faversham factory was remarkable for having evolved the coal-getting explosive "Bobbinite," which was until quite recently "permitted" to be used under certain con-

ditions in fiery mines. This was recognised as a great feat. No lives were lost in explosives factories during the year and the accidents during manufacture, though including many trivial but reportable ones, are small in number compared with the large quantities of explosives produced.

Petroleum Spirit Dangers

INCREASING importance is attached to the work of the explosives department with regard to petroleum, and a large section of the report is devoted to a review of accidents and experiences which arose during the year. Petrol for use for dry cleaning at home again claimed its victims, and the report emphasises the danger of using petrol for domestic purposes other than in minute quantities. It is difficult to bring to the notice of the public adequately these dangers from the use of petrol in the home. Occasional notices in the Press have a good effect, but only for a time, as new potential users of petrol are always growing up. A periodic reminder is required, and the inspectors hope that the Press will give prominence to the existence of these dangers. Attention is also called to the danger of allowing petrol to enter drains and sewers. Particulars are given of many accidents in connection with petroleum spirit, but the list is admittedly incomplete, for petroleum accidents are legally reportable only when injury to personnel occurs. The report includes accounts of typical petroleum accidents abroad, which should be of considerable value in avoiding similar mishaps at home.

The third part of the report is concerned with acetylene, cylinders for compressed gases, and miscellaneous subjects. Work in connection with cylinders for compressed gases for various purposes continues to increase, and it is reassuring to note that the year under review was very free from accidents in connection with such cylinders. The present position with regard to the propulsion of vehicles by compressed gases is reviewed and it is stated that as regards the conveyance by road of various dangerous goods draft regulations have been sent for observation to some of the larger interests with a view to the preparation of a formal draft for publication.

Safety in the Factory

SAFETY organisations have been in active operation in a number of industrial establishments for many years, but the recently issued annual report of the Chief Inspector of Factories and Workshops records a retrograde tendency to abolish the safety committee in some

works and to appoint a safety officer in place of it. It is unfortunate that this practice is spreading. Once a safety committee, and especially a committee on which the workers themselves are represented, has been in operation in a factory, it should be retained. The appointment of a safety officer in addition, to assist and stimulate the work of a committee, is certainly a valuable step, but to abolish the committee and replace it by a safety officer alone has the disadvantage that it fails to encourage the workers to take a keen personal interest in the safety of their fellow workers or in safer working conditions. It tends rather to make workers think that their employers consider safety conditions as matters for the management to deal with alone, and that any suggestion from the workers might be looked upon as an unwarranted interference.

Reference is made in the report to an interesting innovation in a factory where certain workmen in each department, carefully selected and with not less than two years' service, have been appointed as "safety associates" for a period of three months, at the end of which time they will be replaced by others. Their duty is to bring to the attention of the safety committee any dangers or risks in connection with machinery, plant or processes which might otherwise escape notice. In another works the safety committee has organised a class of boys for instruction in safety principles and first aid, and this has been found an excellent plan for young workers. Improved trade conditions have in many instances brought about a refreshing revival in the interest displayed by members of the safety committees in their work of accident prevention. It is probably true to say that this is due to the fact that firms are more disposed during prosperous times to give favourable consideration to the expenditure involved by the introduction of improved fencing and safer arrangements in their works. The encouragement thus given to the safety committees makes a great difference in the attitude and energy displayed by the members of the committees and their spirit is in turn communicated to the general body of workers with beneficial results.

The Health of the Worker

DR. J. C. BRIDGE, senior medical inspector of factories, provides much food for thought in his contribution to the annual report of his Department, extended reference to which is made in other pages this week. It would appear from some of the recent correspondence in the Press that industry itself is to be held responsible for much of the illness from which workers suffer, but with his experience of industrial conditions Dr. Bridge holds that it is outside the factory where most of the ill-health arises. Medical supervision can do a great deal to combat sickness occurring among employees, whether produced within or without the factory, and is to the advantage of both the employer and the employed. Medical supervision is also of considerable value in counteracting the effect of vague sickness certificates to which the words "due to employment" are added. For example, "Gastritis due to employment" is not an uncommon form of certificate. Gastritis is not a very rare condition among the non-industrial population and to ascribe it to a worker's employment, without full investigation, is disadvantageous to the workman and frequently inhibits the benefit he will receive from the prescribed treatment. To continue in work which is alleged to be causing ill-

health is not, to say the least of it, encouraging or profitable, and the effect on the health of the worker, from allegations of this character, is little appreciated by those making them. Some vague idea of compensation which exists, consciously or sub-consciously, in the mind of the certifier is conveyed to the recipient of the certificate. The psychological effect is far-reaching. It would, in Dr. Bridge's opinion, be much better if the practitioner suspecting that an illness was due to employment—and in many cases it must be only suspicion—would communicate with the Factory Department. But how many medical practitioners are ignorant of the existence of such a Department, and until time can be found in the medical curriculum to include a few—even one would assist—lectures on factory legislation and diseases of industry, so long, Dr. Bridge fears, will this ignorance remain.

The subject of industrial pulmonary disease is continuing to engage the attention of an ever-widening circle of industrialists and scientists, and research is scarcely maintaining the rapidity of progress which the keen interest of those in affected industries leads them to expect. Notable progress, however, has been made, and in particular by the fundamental research work on dust clouds, whereby a procedure for routine investigations in industrial processes has been established, which will give certainty and precision to results in a measure hitherto not attainable.

Absolute Zero

ARISING out of the recent discussion by the Royal Society upon the attainment of absolute zero, the question occurs as to whether what is termed "absolute zero" is in fact the lowest temperature that can exist and whether some experimenter will not find his apparatus below that limit. The answer is probably that there is no reason for supposing that a lower temperature is impossible, but that there is reason for supposing that it is the lowest temperature that we can obtain in the present state of knowledge. Absolute zero is the temperature at which electrical resistance ceases, so that a current once started in a conductor may continue indefinitely if shielded from loss of potential by leakage. It is the temperature at which atomic motion ceases. If these mathematical deductions are found to be correct there seems to be no property of matter left that can be used for getting down to temperatures below absolute zero.

When Dr. F. J. Metzger received the Chemical Industry Medal in 1934, he gave a fascinating account of the liquefaction of gases as practised commercially. The rare gases are contained in the atmosphere in such small proportions as 1 lb. in 44 tons (neon), 1 lb. in 173 tons (krypton), 1 lb. in 725 tons (helium), and 1 lb. in 1,208 tons (xenon). Add to this the difficulty that hydrogen, neon and helium all boil within 24° C. of each other, and the difficulties of separation of these gases from the atmosphere in even fairly pure state will be realised. The apparent lack of use for these very rare gases may not long remain. There is some likelihood that krypton and xenon may replace argon in filament lamps, just as argon has replaced nitrogen. A 25-filament lamp containing krypton and xenon is said to operate at an efficiency one-third greater than the same lamp containing argon, and it has been estimated that the substitution of these gases for argon would save no less than one-third of the sum now paid for current.

Industrial Spectrum Analysis—II.

HIGH-TENSION current suitable for spark excitation is usually furnished by transformer units, but it is necessary to distinguish between those types in which the supply current to the primaries is interrupted D.C. and those forms in which it is A.C. High-tension units of the former type offer certain advantages inasmuch as it is possible to prevent overheating of the electrodes by adjusting the frequency of interruption, but units working on A.C. are more generally to be preferred since they yield a very uniform spark and possess facilities for imposing far greater energies.

A convenient form of A.C. unit consists of a $\frac{1}{4}$ kilowatt transformer and auto-transformer supplied with an alternating current of 75 to 220 volts, 50 cycles. By altering tapings on the auto-transformer, voltages ranging from 8,000 to 15,000 in open circuit may be obtained. Where D.C. only is available the set may be supplied through a rotary converter. The spark circuit itself (Fig. 5) includes a condenser and self-induction (Hemsalech) coil, the former being inserted in parallel with the spark gap and the latter in series with it. Experiments have shown that for general

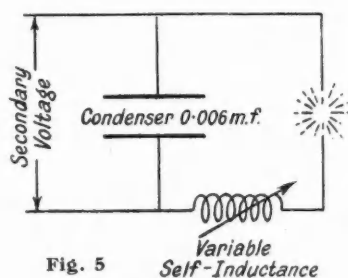


Fig. 5
Variable Self-Inductance

work the condenser should have a capacity of 0.005 to 0.006 microfarad, while self-induction up to 1 millihenry may be inserted if required.

Two chisel-shaped electrodes are prepared and set up in the stand exactly as prescribed for arc emission. In the case of the spark no melting of the electrodes occurs, and in order that representative emission may be secured sparking should take place from as large an area of the sample as possible. Accordingly the chisel edges of the electrodes should be "blunted" to yield strips up to $1/16$ th of an inch in width. The method is simple, and good quantitative results are normally obtained with metals and alloys of reasonable homogeneity. The possibility of small-scale segregation of impurities must, however, be remembered.

By C. S. Hitchen, Ph.D., A.R.C.Sc.,
and C. J. D. Gair, O.B.E., F.C.S.

Small metal fragments may be held in jaws or clips set in the stand. In all cases the sample should be freed as far as possible from sharp points and jagged edges, as these tend to localise the spark.

No entirely satisfactory method has yet been devised for obtaining spark spectra directly from a powder suitable for quantitative analysis, and for such the arc must be employed.

Numerous forms of apparatus have been devised for obtaining spark spectra of metallic salts in solution, but from the viewpoint of refined quantitative measurements many of those devices are unsuitable by reason of the fact that, during sparking, the dissolved salts tend to separate out and encrust the electrodes. This is particularly true of the U-tube arrangements devised by Hartley and Pollock. A new form of apparatus is now available, however, which yields excellent results and successfully overcomes difficulties of incrustation. In this contrivance fresh supplies of solution are continuously fed from an upper reservoir into the spark gap, where they become atomised by the force of the spark itself. The method is due to Twyman and Hitchen.

A useful technique for the quantitative spectrographic analysis of very fine wires, such as those employed in lamps and thermionic valves, has been developed by J. W. Ryde. By this it is possible to estimate as little as 0.2 per cent. of thorium in tungsten filaments, while quantities down to 0.005 per cent. of other impurities can be detected and estimated. The method is naturally of limited metallurgical application.

Condensing Lenses

Having considered the light source we turn to the light condensing system. As already mentioned, a condensing lens is not always required, when, however, it is necessary a form of adjustable stand similar to that portrayed in Fig. 6 should be employed. Two types of lens are available—the spherocylindrical and the spherical. The latter gives an enlarged image of the source on the collimator slit or elsewhere. The spherocylindrical lens gives a line image of the source. Both have their particular uses. They can be obtained in quartz or glass. Many investigators dispense with them altogether, compensating for the resulting loss of illumination by increase of exposure.

It is sometimes desirable to focus an image of the light source upon the collimator lens instead of on to the slit. A spherical condenser is used for the purpose. The slit is initially opened wide, and the tips of the electrodes so

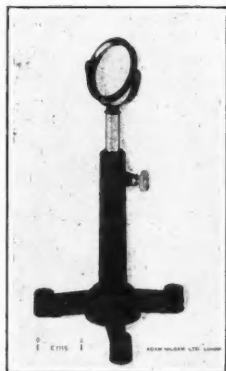


Fig. 6 (above)

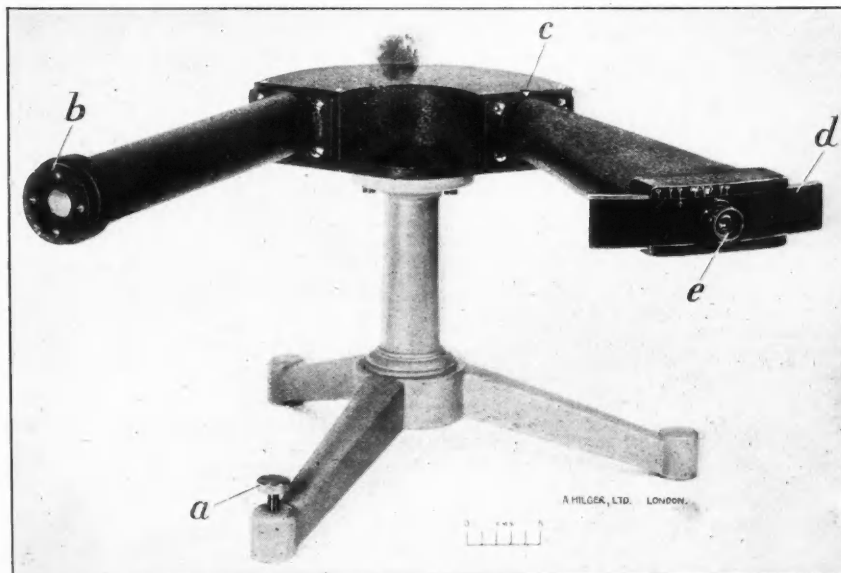


Fig. 7 (right)

adjusted that they appear central in the field and fully contained therein. This method is used with the Logarithmic sector, and it is claimed by Twyman and Simeon that it ensures the spectrum lines being uniformly bright along their length. As contrasted with the "arc," the "spark" is comparatively steady.

In regard to slit widths, times of exposure, etc., the reader must be referred to the literature of the subject and especially to D. M. Smith's treatise, "Metallurgical Analysis by the Spectrograph" (Non-Ferrous Metals Research Association). This work contains an extremely useful bibliography which, with some additions, is separately published. Useful details are also contained in "Spectroscopy in Science and Industry," by S. Judd Lewis (Blackie).

Consideration of spectrometers and spectrographs now claim attention. For those cases in which a visual method of analysis is adopted, a spectrometer of the "constant deviation" type is best. Such instruments have the collimator and telescope fixed at right angles to one another, the required spectral line being brought on to the eye-piece pointer by partial rotation of the special form of prism employed. Wavelengths are read from a calibrated drum by an index running in a helical slot. Movement of this drum effects the required partial rotation of the prism. Such instruments may be employed for qualitative analysis, approximate quantitative analysis and more accurate determinations by various visual methods.

In connection with approximate analyses, mention may also be made of the Hilger "Spekker Steelscope" (Fig. 7). This is a special form of high-dispersion spectroscope. It has been employed with considerable success for sorting rods, etc., in steel warehouses and scrap yards, and is constructed so that permanent adjustment is effected for the more sensitive lines of the alloying elements of steels. By its aid unskilled workers are able to detect the nature of these and obtain approximate percentages by judgment of line intensities. The "Steelscope" enables rapid distinction to be made between such types as (1) a carbon steel containing between 1 and 2 per cent. nickel, (2) case-hardened nickel steels containing 2, 3 and 5 per cent. nickel, (3) nickel-chrome steels containing 0.5, 1 and 1.5 per cent. chromium. Distinction can also readily be effected between steels carrying various small percentages of alloying ingredients, such as cobalt, molybdenum, tungsten, vanadium, manganese and titanium.

Similar instruments are now supplied for the examination of non-ferrous metals and alloys for various impurities, e.g., iron and lead in brass and bronze.

Coming to spectrographs, it should be pointed out that the type and size of a quartz instrument suitable for industrial analysis will primarily depend upon the complexity of the spectra of the substances to be examined. Where these consist of the commoner non-ferrous metals and their alloys, or other substances with comparatively simple spectra, a spectrograph of medium dispersion, such as that illustrated (Fig. 8) may be advantageously employed. These instruments are of standard design and yield spectra from 2,100 Å to 8,000 Å

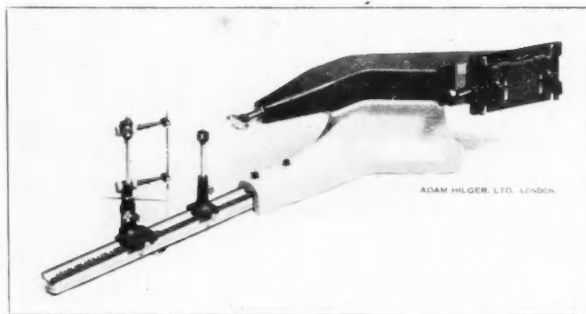


Fig. 8

spread over a length of approximately 20 cm., thus enabling them to be photographed on one (10 × 25 cm.) plate. While such is certainly desirable, it may be stated that analyses of brass and lead for various impurities have been successfully carried out on instruments of much smaller dispersion (1,850 Å-8,000 Å = 8.5 cms.).

A spectrograph of very high dispersion is necessary when dealing with substances composed of one or more of the following elements: chromium, cobalt, iron, manganese, molybdenum, thorium, titanium, tungsten, uranium, vanadium, zirconium, platinum, indium, rhodium, osmium, palladium, or containing these in appreciable amount.

(To be continued.)

Quartz Spectrographs for Industry and Research

Features which may Determine the Choice of an Instrument

ANALYTICAL control by spectral methods, and likewise research, demands the use of an instrument of the highest possible accuracy. In addition to obtaining optical definition of a high order, the mechanical design must be capable of giving perfect adjustment and ease of manipulation. Potential users of the spectrograph should therefore be interested in the various features which are now incorporated in this type of instrument as supplied by one well-known English maker, Bellingham and Stanley, Ltd.

All the spectrographs supplied by this firm are provided with a metal framework, in which are mounted the optical elements; this ensures rigidity and permanence of adjustment

symmetrically-opening slit which has a reducing wedge and sliding plate with three apertures for taking comparison photographs.

Fig. 1 shows a spectrograph in which the mounting of the optical elements has been arranged to have a horizontal slit and photographic plate. This method of mounting has several advantages. The spectrum can be more easily observed, the instrument is more rigid, and for such purposes as the study of fluorescence a horizontal plate is almost essential. As the plate is horizontal, no mechanism is required to maintain it in position, but it can be conveniently moved by hand and clamped; this method ensures exact

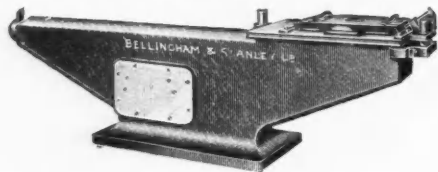


Fig. 1

The lens system is corrected to give the finest definition combined with flatness of field and large aperture ratio. A spherocylindrical lens, of the correct focal length to form a line image of the light source on the slit, is attached to the instrument and greatly facilitates the correct setting of the light source. The instruments are also equipped with a



Fig. 2

alignment of the spectra, which may be taken on the same plate. The optical system consists of a Cornu quartz prism, and collimator and camera lenses specially corrected to give good definition and flatness of field. The slit has symmetrically-opening jaws and a projecting ring with standard screw thread provides for the attachment of other apparatus, such as a photometer for the ultra-violet.

With the instrument shown in Fig. 2 the length of spectrum from wavelength 8,000 Å to 2,100 Å is 210 mm. The dispersion thereby obtained is sufficient to meet most requirements. The prism, darkslide carrier, collimator and camera lenses are all fixed to a rigid metal base. The darkslide, which carries plates 10 in. by 4 in., or 10 in. by 2 in., if



Fig. 3.

desired, travels in metal slides, and is raised or lowered by means of a screw with bevel gearing which is attached to the centre of the darkslide mount; this method of adjustment to the darkslide gives a smooth and accurate movement to the plate.

The length of spectrum from wavelength 8,000 Å to 2,100 Å as obtained with the spectrograph shown in Fig. 3 is 650 mm. This instrument is recommended when it is required to examine complex spectra, such as those given by iron, nickel, tungsten, titanium, etc.; for these metals greater dispersion is required than can be obtained with the smaller instruments. This spectrograph, moreover, is of the auto-collimating type, in which only one lens is employed, the

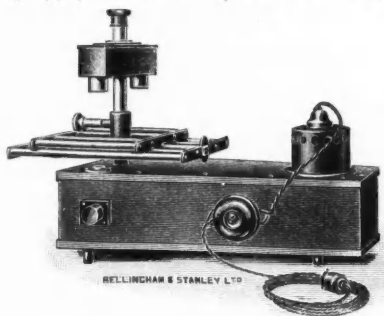


Fig. 4.

light from the entrance slit being reflected back over its original path to the photographic plate. The spectrum between wavelength 8,000 Å and 2,100 Å is photographed in three sections on a 10 in. by 4 in. plate. To provide for the necessary adjustments the prism and lens are mounted on a carriage travelling by means of a screw motion on a slide, and both prism mount and carriage can be set at the correct position with the necessary degree of precision.

The determination of the wavelength of a particular line in a spectrum photograph presents considerable difficulty unless the wavelength of neighbouring lines are known. A wavelength scale is of some assistance, but where only relatively small dispersion is available the scale can only give approximate values. One of the most accurate methods of obtaining wavelength measurements is to use a comparison spectrum, such as the copper arc, and to determine by



Fig. 5.

means of a graph the wavelength of the more important lines, which can be checked against standard tables. The comparison spectrum can then be used on the comparator to determine the wavelength of lines in the unknown spectrum.

The spectro comparator, shown in Fig. 4 complete with illuminating box, is constructed so that in one half of the field of view the comparison plate is seen, while in the other half is the unknown spectrum, on which must also be photo-

graphed the spectrum which is serving as a comparison. On the dividing line which separates the two fields is mounted a micrometer scale reading to one-tenth millimetre, and by means of this the wavelength of an unknown line can be determined using the Hartmann interpolation formula. If desired, a standard iron spectrum plate can be supplied on which all more important wavelengths are marked; on this plate is also indicated the position of the more persistent lines of the elements. The spectro comparator may also be used for measuring the intensity of photographed spectrum lines. For this purpose a fine line is ruled in the silvered reflecting surface of the eyepiece prism combination, and on one side of the sliding carriage is mounted a graduated neutral tint wedge. This wedge controls the illumination of the ruled line and has the effect of forming an artificial spectrum line, the intensity or density of which may be varied. When

a spectrum plate is placed on the comparator opposite to the neutral wedge, any desired spectrum line may be brought into position parallel to the artificial line and the wedge moved until the density of the two match.

The new 1935 model B-S spectrograph (Fig. 5) is arranged to photograph the spectrum between wavelengths 2,000 Å and 10,000 Å in sharp focus, with one exposure. This is the range which covers all ordinary work both for emission and absorption spectra.

Accidents in the Chemical Industry

An Analysis of United States Returns

THE United States National Safety Council reports that the 1934 accident-frequency rate for the chemical industry is 5 per cent. lower than that of 1933, but the severity rate is 6 per cent. higher, according to figures based on reports from 254 plants, whose employees worked 217,509,000 man-hours. These figures, just issued, show that these plants averaged 10.30 for frequency, in comparison with 15.29 for all industries, and 1.81 for severity, in comparison with 1.70. The injury frequency rate is based on the number of disabling injuries per million man-hours of work, while the severity rate is determined by the number of days lost through disabling injuries, per 1,000 man-hours of work.

On the basis of the Council's figures, chemical plants tied with non-ferrous metal plants for the ninth lowest place in frequency of accidents in a list of 30 major industries, and twentieth in severity. Since 1926, the frequency of disabling injuries has decreased 58 per cent. in the chemical industry, in comparison with a reduction of 57 per cent. for all industries. In severity, however, the decrease in rate is only 12 per cent. against 37 per cent. for all industries.

In 1934, large units had the lowest frequency rates, but were outstripped by small plants on the basis of severity. However, when the records of change from 1933 to 1934 are compared, large plants have better records than small ones. The experience is shown in the following table:

Size Group	1934. Frequency Rate.	1934. Severity Rate.	1933-1934. Change in Frequency.	1933-1934. Change in Severity.
Large	9.02	1.96	- 5 ⁰ / ₁₀ %	+ 17 ⁰ / ₁₀ %
Middle-sized	13.34	.89	- 26 ⁰ / ₁₀ %	- 50 ⁰ / ₁₀ %
Small	15.91	1.05	- 8 ⁰ / ₁₀ %	+ 141 ⁰ / ₁₀ %

Among the various kinds of plants, 1934 injury rates were lowest in those manufacturing carbon products. These plants averaged 4.04 for frequency and 0.31 for severity. Further comparisons may be obtained from this table:

Industrial Group	1933-1934 Change in Frequency.	1933-1934 Change in Severity.
Pharmaceutical and fine chemical manufacturing ...	- 22 ⁰ / ₁₀ %	+ 231 ⁰ / ₁₀ %
Vegetable oil manufacturing ...	- 20 ⁰ / ₁₀ %	+ 80 ⁰ / ₁₀ %
Soap manufacturing ...	- 19 ⁰ / ₁₀ %	+ 136 ⁰ / ₁₀ %
Not otherwise classified ...	- 5 ⁰ / ₁₀ %	- 39 ⁰ / ₁₀ %
Dye manufacturing ...	+ 11 ⁰ / ₁₀ %	- 46 ⁰ / ₁₀ %
Paint and varnish manufacturing ...	+ 13 ⁰ / ₁₀ %	- 78 ⁰ / ₁₀ %
Explosives manufacturing ...	+ 53 ⁰ / ₁₀ %	+ 39 ⁰ / ₁₀ %
Coal tar distillers ...	+ 67 ⁰ / ₁₀ %	+ 140 ⁰ / ₁₀ %

Twenty-four chemical units were cited by the National Safety Council for outstanding safety records during the year.

Health in Chemical-Using Industries

THE reduction in cases of lead poisoning in the past few years has not been maintained, states the Annual Report of the Chief Inspector of Factories and Workshops for the year 1934. There is an increase of 30 over last year's figures, mostly among pottery workers, as foreshadowed in the annual report for 1933. Of the 26 cases in the pottery industry, 16 cases occurred in the manufacture of highly-decorated tiles; the tile was a marl tile, the manufacture of which lessens the risk of silicosis but increases the risk of lead poisoning owing to the highly-leaded glaze used. During the early autumn four cases of lead poisoning of furnace men occurred at a silver refinery, where some 64 men were employed. One case is interesting as affording confirmation of the danger attached to the spraying of metallic lead on glass by means of a pressure gun.

Of the three cases of arsenical poisoning, one was caused by sodium arsenite in the manufacture of weed killer, another by aceto-arsenite of copper (emerald green) in the manufacture of paints and colours, and the third by the process of pouring metallic arsenic into molten lead in the manufacture of lead shot.

Aniline Poisoning

Nine cases of "anilism" (aniline poisoning)—the lowest number notified since the disease became reportable—occurred in the following processes: handling of 5 chlor-ortho-toluidine hydrochloride (associated with painful micturition and hæmaturia), 3; aniline oil, 2 (including one which occurred during the unauthorised use of aniline oil to remove paint from the glass windows of process offices, and necessitated absence from work for 7 days); paranitraniline, 1; paratoluidine, 1; making of intermediates (D.N.B. and D.N.T.), 1; and aniline black dyeing, 1.

Of special interest in industrial toxicology at the present time is the question of the various forms of anæmia, especially those of the aplastic type. A study of the differential diagnosis is essential when considering cases of the disease in workers in contact with benzol, chronic poisoning by which is evidenced by an anæmia of aplastic type.

The use of rubber solutions containing benzol for motor upholstery work has evoked inquiry into the effects on health of exposure to the fume arising in the course of this work which in some situations hardly allows for localised exhaust ventilation. A number of firms were visited and the inspection of workers included blood examinations. The results justified the conclusion that a non-toxic substitute for benzol in rubber solutions was highly desirable, and this was represented to the manufacturers of such solutions.

Use of Less Toxic Products

No case of toxic jaundice due to arseniuretted hydrogen, tetrachlorethane, or nitro- or amido- derivatives of benzene has been reported during the year. Generally speaking, tetrachlorethane in most factory processes where it was previously used has been replaced by non-toxic or much less toxic products. An inquiry as to the extent of its present use on factory premises showed that it was mainly confined to experiments in the laboratory, and occasionally in factory processes for the removal of pitch from wool and lenses, in the manufacture of water gauge indicators and insecticides, or as a solvent for waxes, fats and dye intermediates. One firm which has long used it for the latter purpose has now decided to use a substitute.

The increase in the number of cases of chrome ulceration is attributable to the further extended use of the process of chromium plating. The growing tendency for firms to apply for the extension, or for too long an extension, of the required fortnightly interval between the medical examinations, suggests that the value of frequent supervision by a medical man in this connection is not fully appreciated. While it is a comparatively simple matter for the responsible person who examines the worker in the interval between the doctor's visits to detect the presence of a defect of the skin, it requires medical experience to estimate the degree of damage to the skin and its cause.

The progress made in initiation of voluntary medical examinations in those trades where there is contact with cancer-producing substances is slow and varies considerably

The Chief Inspector of Factories and Workshops Surveys Present-Day Hazards

according to the trade. Progress in tar distilleries leaves something to be desired. While in the larger works periodic examination is becoming the rule, and some District Inspectors report that all the tar distilling plants in their areas have fallen into line except those in liquidation or in process of construction, there are still many, including smaller works, where the suggestion has not been adopted.

Fifty-seven deaths from silicosis and 50 from silicosis with tuberculosis have come to the notice of the Department during the year, together with six deaths from asbestosis and eight from asbestosis with tuberculosis.

The regulations for the asbestos industry have now been in force in entirety for nearly three years. Further experience of the regulated trades gained during the year has confirmed the value of the safeguards, chiefly efficient exhaust ventilation, directed towards the suppression and removal of dust. Many asbestos departments have been completely transformed in the period since the code became effective.

Manganese Poisoning

At one factory in which the grinding of manganese ore is carried on, the 16 workers were examined. Of these, five were found with early signs of manganese poisoning. The employees were undoubtedly insufficiently protected against a very noxious dust, and, following strong representations made at a conference with the directors of the firm, it was agreed that reorganisation of the plant was essential.

There is a substantial increase in the number of cases of gassing due to blast furnace gas, which is difficult to account for except by the number of furnaces which have been restarted. There can be no doubt that very special precautions need to be taken on the occasions when furnaces are restarted after standing or after repair. One fatality was unusual, in that the deceased, a crane driver, brought his crane over an annealing furnace, and was found unconscious later.

Only two cases of gassing by hydrogen sulphide occurred during the year, one being due to an escape from a tar still at an iron and steel works, and the other to the emptying of ferrous oxide absorption boxes used in the manufacture of sulphate of ammonia in a fertiliser works. Cases of conjunctivitis attributable to this gas continue to occur in the manufacture of artificial silk by the viscose process.

Gassing Risks

Five cases of gassing (three severe) arose from vats used for de-brassing. The process had been carried on for eight or nine years without apparent risk, although on several occasions it was stated that the odour of the fumes could be detected on entering the department. Certain factors precipitated the occurrence of the cases, namely, the increase in the number of vats, resulting in some congestion; starting up of a new vat, which gave rise to excessive evolution of fume; and the weather conditions prevailing at the time.

Of the 18 cases (11 fatal) of gassing by ammonia, 13 (11 fatal) occurred in an open-air refrigerator plant at a chemical works, all painters, electricians, fitters and labourers working on or around the condenser tower being affected and, in all but two, fatally. The gas escaped by reason of the bursting of a 9-inch safety aluminium disc at a much lower pressure than was anticipated by calculation and even somewhat lower than was shown by subsequent tests of the bursting pressure of similar discs fitted in an exactly similar manner. This was approximately at least half what had been calculated previously. As there was apparently no reason to apprehend danger, gas masks were not being worn by the injured persons, but they were easily accessible and were worn by the rescuers whose work was efficiently organised by the resident medical officer who was present within a few minutes of the accident.

In spite of warnings and instructions the number of cases of acute gassing during the year increased to ten, and occurred in the following processes: metal degreasing, 7; dry

cleaning, 1; washing photographic plates, 1; and filling a tank, 1. The cause of these cases is to be found either in failure to operate the plant in a proper manner or in entering the tank or container in spite of warnings and notices.

Three cases (one fatal) of gassing by phosgene were attributable to the use of a Pyrene extinguisher for putting out a fire in spaces which did not appear to be particularly confined, within 5 to 15 minutes of extinction of the flame. Two occurred in a sub-station of a corporation electricity department, the fire being due to ignition of spilt petrol used for filling a blow lamp.

In view of the use of hydrocyanic acid for disinfestation in ships and in connection with measures for slum clearance, the manufacture of this poison is of importance. Fortunately, it is limited to a very few manufacturers, mostly with years of experience. In one factory which came to notice, all the processes entailing the most serious risks were carried out by the proprietor, who had a scientific training and the necessary knowledge and skill to avoid serious injury. So long as the process can be kept in the hands of persons with the requisite knowledge, it appears that the danger of the process can be controlled, but as a result of increased demand for the acid the manufacture may possibly fall into the hands of inexperienced persons, with consequent risk.

In the annual report for 1933, the toxic effects of diethylene dioxide (dioxan) were described, reference being made to experiments which were then being undertaken to throw further light on the matter. These experiments have now been completed and the results have been published ("J. Hygiene," January 5, 1935, p. 486). The use of this substance has been discontinued and no sequelæ in the workers concerned have been brought to light. Since, however, close relationship exists between dioxan and ethylene glycol (dioxan being formed from ethylene glycol when distilled with certain acids), special attention was paid to workers

employed in a process necessitating a glycol borate mixture being heated, but to a temperature below that of the boiling point of ethylene glycol. Laboratory tests pointed to a slight degree of liver damage to one man, aged 38, after ten months' exposure, while in another younger man, similarly employed for eight months, albuminuria, which may or may not have been of significance, was noted. These men are still under observation, though conditions have been so improved with a view to preventing inhalation of the vapour or its contact with the unprotected skin, as to render unlikely any injury to health apart from that referable to the initial exposure.

Certain temporary gastric and other effects from excessive inhalation of carbon tetrachloride have been noted, but no untoward sequelæ appear to have arisen.

Absorption of nicotine by the skin was responsible for an attack of faintness and nausea in a labourer who was spraying nicotine into a mixer during the manufacture of an insecticide powder for hop plants at a chemical works. Five men were concerned in this process, including the manager, who was also slightly affected. In future, protective clothing, including rubber gauntlet gloves, will be used.

The number of cases of dermatitis reported during this year has very greatly increased. Seeing that there is often so great a difficulty in correctly ascertaining the casual agent or agents, it is not to be wondered at that the question of appropriate preventive measures presents a problem of great magnitude. The general principles for protection may be summed up as follows: (a) *Protection from the suspected agent* by (1) lessening contact by mechanical methods of handling; (2) gloves, etc., wherever practicable; (3) suitable emollients. (b) *Care of the skin* by (1) careful attention to cleanliness; (2) repair of damage to the skin by making good those properties removed by the materials with which it has been in contact; (3) avoidance of any mechanical damage to the skin; (4) protection of any such damaged part of the skin.

Risks in the Manufacture and Handling of Explosives

Annual Report of H.M. Inspectors of Explosives for 1934

ACCORDING to the 50th "Annual Report of H.M. Inspectors of Explosives for the Year 1934" (H.M. Stationery Office, 9d. net), accidents in factories licensed for the manufacture of explosives were few in number and the year was free from fatal accidents in licensed factories. This is the third time on record that a year has passed without a fatal accident in a licensed factory; the other years were 1922 and 1929.

Only one accident occurred in the making of nitroglycerine. This happened in the final washhouse which consisted of two tanks, one a lead tank and the other a wooden tank lined with rubber. Each tank was fitted with the normal arrangement for the supply of compressed air, namely, a half-inch lead pipe for the main supply and a quarter-inch lead pipe with an open end and no perforations, lying in a semi-circle round the bottom of the tank and pointing directly into the outlet faucet of the tank. These pipes are fitted with rubber rings to prevent contact of the pipes with the tank. Prior to the accident, each tank had contained overnight a charge of completely washed nitroglycerine which had been run off into the filter tank, and the wooden tank was being prepared for the reception of the first half of a fresh charge and the operator had opened the quarter-inch air pipe and was about to open the cock of the half-inch air pipe when the detonation occurred. About seven feet of the quarter-inch pipe disappeared and the woodwork of the tank broke in two or three places.

Preventive Measures

There is no doubt that the detonation occurred in the quarter-inch air pipe line and the fragmentation of the line could only have been caused by a considerable amount of nitroglycerine. It has been decided that in the future the quarter-inch air pipe will not be led round the bottom of the tank but led down vertically from a point above the outlet faucet of the washing tank; also the number of rubber rings on both air pipe lines will be increased to prevent any possible sagging of the pipe lines, and a hot water supply will be connected to the pipe lines so that they may be washed out after the tank has been emptied.

Ignitions in gunpowder incorporating mills have decreased to a remarkable degree. For the last fifteen years there has been an average of about nine ignitions per year. None occurred in the two years 1932 and 1933 and in this year only one slight ignition occurred and there was no damage to worker or property. There were no unusual features in the minor accidents which occurred with guncotton and propellant powders.

A rather unusual accident occurred with lead azide. Samples were being dried in a desiccator over sulphuric acid, when a portion of about 1 gram on a watch glass fell into the sulphuric acid and immediately exploded.

In the manufacture of colliery safety lighters a mixture of potassium chlorate and sugar is used. The mixture itself is not classified as an explosive but there are definite reasons for treating such a mixture with care, as was demonstrated by an accident which occurred during the drying of 2 lb. of it in a steam-heated oven. No one was present when suddenly there was an explosion of such violence as to burst open the oven and cause considerable damage to the roof and walls of the building. It should be noted that potassium chlorate when suddenly heated to a high temperature becomes explosive *per se*, and at high temperatures it also acts very violently on combustible bodies. There is no doubt that this explosion was due to the steam oven becoming overheated.

Accidents in Firework Factories

It is satisfactory to note that accidents in firework factories have been few and relatively unimportant and particularly that those accidents caused by aluminium-chlorate or aluminium-barium nitrate mixtures which in recent years caused anxiety have been entirely absent this year. Firework manufacturers are again impressed with the advisability of submitting to the Inspectors any composition of which the sensitivity may be questionable.

A serious accident occurred in a firework factory in India, where a mixture of 6 lb. potassium chlorate, 2 lb. sulphur and 1 lb. aluminium dust had been made, when an iron weight accidentally fell on to it. It immediately exploded

and the factory, which consisted of a one-room stone building, was completely wrecked, eleven people being killed and seven injured.

As usual, by far the greatest number of accidents in use occurred through persons not taking proper cover when blasting operations are in progress. This year five people were killed and 89 injured from this cause, and it would appear from the reports that many were avoidable and several due to the danger of ricochets from walls, tubs, etc., not being properly appreciated.

In his annual report for the year ending March 31, 1934, the Chief Inspector of Explosives, New Zealand, again stresses the dangers arising from the careless and improper use of the chlorates of sodium and potassium. One fatal accident occurred through the use of blasting explosive made from sodium chlorate and sugar. This mixture was being rammed into a borehole in a log when it exploded. Another fatal accident involving sodium chlorate occurred after a solution of it had been employed as a weed killer, for which purpose it is largely used. The deceased had been spraying ragwort in the afternoon and had neglected to change his clothing afterwards. Later in the evening the lighted head of a match fell on his clothes, which immediately burst into flames. In the time which had elapsed after the spraying was finished the moisture had dried out of the clothes and they were in a highly inflammable condition, being impregnated with finely-divided sodium chlorate.

Storage of Petrol

Points of interest in connection with the storage of petroleum spirit are illustrated by two accidents. In the first case the leakage of the vapour from the underground tank was caused by a faulty vent pipe under a shop window. This defect was remedied, but the accident illustrates the importance of installing and maintaining the storage tank and its connections in a satisfactory manner. The other case concerns the method of storage of other inflammable material, such as Diesel oil, near petroleum spirit and the necessity of taking precautions to prevent outflow in the event of a fire. In this case the fire rapidly increased in violence owing to the bursting of the petrol tanks on the vehicles present in the dépôt. These tanks varied from 30 to 50 gal. in capacity and there were about thirty large transport wagons present and merchandise of every description in the course of transit.

The necessity of delivering petroleum spirit from a tank wagon to the storage tank under seal and the selection of a suitable position for the filling point is emphasised by three accidents. It is necessary to provide the storage tank with a properly constructed vent pipe at the end of which fine-wire gauze is fitted, and this is erected in a suitable position in order to prevent a dangerous collection of vapour occurring, more particularly during the operation of filling the storage tank. In two of these cases the object of the vent pipe was stultified as in the first case the cap on the dipping hole had not been replaced, the vapour was therefore driven into the office over the tank, where it exploded. In the second case the filling hose was placed loose in the filling hole. This not only allowed vapour to escape from the filling hole, but increased the possibility of a spark being produced due to the generation of a static charge during the flow of the petroleum spirit through the hose, as the end of the hose was not in contact with the tank which would be earthed, and, further, the vapour was expelled at about ground level and thus had less possibility of dilution to render it harmless than if expelled from a vent situated several feet above the ground.

Transport Accidents

Three accidents during the conveyance of petroleum spirit by road were reported. In one case, near Pumphreston, a large tanker of the tractor and trailer type conveying 2,500 gal. of petrol crashed into the wall of a bridge through the breaking of the driving axle. The petrol in the front compartment only, which was fractured, was spilled, that in the remaining compartments burnt at the lids which were blown off by internal pressure from the heat, but did not escape.

The largest number of deaths occurred during the use of petroleum spirit, and the ten accidents reported under this heading caused seven deaths and injuries to six persons. Four of these accidents occurred during dry cleaning and caused three deaths and injuries to two persons.

The safety devices now fitted to acetylene cylinders for the

purpose of relieving high pressure and preventing their bursting are of two types—bursting discs, designed to shear at a predetermined pressure however caused, and fusible metal plugs which melt and allow the gas to escape if cylinders are involved in a fire. Experience has shown that neither type functions with any certainty. Cylinders containing any compressed gas, even carbon dioxide (in itself a good fire extinguisher) are dangerous in a fire, and it was felt that a really reliable safety device would be of great service for cylinders generally and other high-pressure vessels. Arrangements were therefore made for an investigation by the National Physical Laboratory in which the industry is co-operating.

Cylinders for Compressed Gases

Work in connection with cylinders for compressed gases other than acetylene continues to increase. Inquiries have been made from several sources regarding the use of compressed coal gas for domestic purposes. The Chesterfield Tube Co. have submitted samples of high-pressure alloy steel cylinders through the Home Office for examination by the National Physical Laboratory. These cylinders are a little heavier than those used for gas traction purposes to provide a higher factor of safety on account of the fact that they are loose and not fixed cylinders.

Another possible development may be for the domestic use of butane and other heavy hydrocarbon gases obtained during oil distillation, or during the production of oil and petrol from coal, for houses out of reach of coal gas supply. Investigation is also being made by the National Physical Laboratory into the suitability of certain foreign-owned welded cylinders sent to this country to be filled with liquefiable gas. The suitability of certain containers for the conveyance of sulphur dioxide and of lead-lined drums for the carriage of bromine is also under investigation.

The year has fortunately been very free from accidents in connection with compressed gas cylinders. An accident reported from Hastings, which fortunately did not lead to casualties from the escaping chlorine, is of interest. On August 18 at Hastings bathing pool a cylinder containing about 30 lb. of chlorine was being opened when the valve broke off at the neck. No great force was being applied. The valve was clearly defective and probably was nearly cracked through or a serious flaw must have been present in the metal.

Sampling of Coal Tar

New British Standard Specification

THE British Standards Institution has just issued a British Standard specification for the sampling of coal tar and its products. In the course of the Institution's work in the preparation of specifications for creosote the need for a recognised method of sampling became apparent. A number of specifications for other coal tar products were also in course of preparation by other committees, and it was felt that the establishment at an early date of a standard method of sampling was necessary, in order that the individual specifications might make reference to it.

The specification for sampling of coal tar and its products is dealt with in four sections covering general precautions, design and use of apparatus, general procedure for sampling of packages, tanks and pipe-lines. A further section is devoted to the method of drawing the bulk sample and the preparation from the bulk sample of the final sample. The sampling of creosote oils with an aqueous layer at the bottom or top is included for general information and guidance in an appendix.

The committee responsible for the preparation of this specification has explained in the preface that no specification, however explicit, can take the place of judgment, skill and experience, and that the directions given are intended primarily to supplement such experience and to serve as a guide to the selection of the best method. The specification should serve a very useful purpose as a guide to the sampling of coal tar and its products and will form a valuable reference in respect of those specifications now in course of preparation for various tars and their products.

Copies of British Standard specification No. 616 (1935) may be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. (2s. 2d. post free).

Chemical Industry and Carl Duisberg *

“**A** LAS, poor Yorrick! I knew him, Horatio: truly a fellow of infinite jest, of most excellent fancy; a masterful leader of men!”¹ In telling the story of Carl Duisberg the history in large part is told of the most intricate and far-reaching of modern industries—also the history of an unparalleled advance, due wholly to the considered use of scientific endeavour by a nation; an advance involving incidentally a vast increase in man's knowledge of himself, of his power over himself and the world—all this the growth of only four-fifths of a century! Curiously enough, the upgrowth of Germany as an industrial nation has been almost coincident with that of Japan. Whilst, however, the constructive advance of Germany has been intellectual and original, the advance of Japan has been imitative and mechanical: she has given no evidence of any special intellectual advance, such as has been apparent in India, for example, in a remarkable development of mathematical physics. It is, however, possible that we are too simple-minded to plumb her actions. Being free from our Western traditions and prejudices, especially from our stubborn individuality, maybe the Japanese have fathomed the value of scientific method, indeed of method in general, as we certainly have not: that consequently they are working to a clearly conceived plan. If so, they will be very dangerous as rivals. At least, they have the courage of their convictions and do things.

At the moment, Germany is abandoning the method to which she owes her success: is she to continue on the down-grade or to recover her liberty of thought and action? Is Japan likely to advance sufficiently in intellectual power to sustain the great burden she has undertaken: is this not already too heavy? May it not be that her arrogance comes from the fact that the old military element is regaining ascendancy? Having been a student in Germany before the war of 1870; having soon afterwards had as colleagues two of the men who shortly before had been instructors of the Japanese in our Western arts: I have long been more than an interested observer of the march of events. The one great point in favour of the Japanese is that they seem to be able to learn a lesson; our European characteristic is that we cannot and that our rulers are ascientific—playing dangerously only upon the credulity of the masses, without understanding the true state of affairs.

A Great Citizen

By Carl Duisberg's death Germany is deprived of one of the greatest and most valuable citizens she has ever had; in the legend of the future, he may well come to be considered the most efficient and effective industrialist the world has yet known—he played with consummate skill so varied a part, with such unusual forcefulness of character, clearness of understanding and breadth of outlook, ever with entire devotion to his country and to his chosen and beloved science. The foundations of his success were certainly laid at the university, in Germany long the accustomed resort of the intelligent, including the upper commercial class—not the mere scholarship-fed, aimlessly competitive racing stables into which we have allowed ours to drift.

The story of Duisberg's early career is profoundly interesting. His father, a silk riband manufacturer and merchant, wished him to enter the business but he was attracted to chemistry while still at school. Leaving properly early he went to Göttingen, then to Jena. He had taken his degree when he was twenty, before the close of his sixth semester. At Göttingen he first came under Jannasch, who set him to work at complex analysis. In the second semester he was under Hübner, who used him to study the bromination of benzoic acid. Finding, at the end of the year, when he almost had a thesis ready, that he could not take a degree at Göttingen, as he had been at a non-classical *oberrealschule*—moreover, that in any case he must continue his studies during four more semesters—he went to Jena. He most fortunately came under Geuther, long an assistant to

By Professor Henry E. Armstrong, F.R.S.

the great Wöhler, the steady philosophic influence in the Liebig-Wöhler partnership. Geuther was incensed when he learnt how Duisberg had been treated—that he had had no drill in preparation making. He insisted on his going through a full course of disciplinary exercises, both inorganic and organic, in laboratory technique, making him work with the simplest means. Eventually, he gave him a theme for his doctorate—of course, dealing with aceto-acetic ether, of which Geuther (together with Frankland and Duppa) was the discoverer. His chief subject was chemistry, with geology, mineralogy and national economy as secondaries—in choosing the last the child was father to the man.

Having taken his degree, anxious to be independent of his father, without informing his teacher, Duisberg sought and obtained a post in the public food analytical laboratory at Crefeld. Evidently seeing how great was his ability, Geuther indignantly insisted that he must not so demean himself. He had no assistantship vacant but made him his private assistant, according to Duisberg's own statement, in his obituary notice of Geuther (“Ber.,” October 15, 1930), at the princely pay of 80 marks—instead of the usual 100—with a garret above the laboratory to live in. In the book issued at the time of his seventieth birthday (“Carl Duisberg, ein deutscher Industrieller”), Duisberg is made to say that he was paid 1,000 marks, instead of the usual 1,200, plus the garret. So is history written! Geuther stipulated that he should not leave him until he obtained a suitable industrial post. The year must have been invaluable to him. The curtain fell dramatically—on a smash of glass! Finding that no one would employ him until he was *militärfrei*, Duisberg decided to join up at Munich. Geuther, when told of his intention, bitterly resented his leaving, insisting that he must keep his bargain. The end came when, one day, after angry discussion at his bench, Duisberg followed his master out of the laboratory brandishing in his face a large globular flask which he had been cleaning; eventually, as he reached the door, flinging this violently at his feet. Repentance came at once. Calling upon the Rector he told him what had happened and that he feared Geuther would make it impossible for him to become an officer. Evidently the Rector sympathised, as he advised him not to take the occurrence too seriously, but to go to Munich. Such was the dramatic ending of his university career. He left magnificently trained.

Study of Dyestuffs

At Munich, while serving as *Freiwilliger*, Duisberg worked in his spare time under von Pechmann; probably he was a little too lively for Baeyer. At the end of this year of military service he was engaged, with two others, by Karl Rumpf, head of the *Farbenfabriken vormals F. Bayer and Co.*, Elberfeld. Owing to the slump in alizarin the firm was in queer street, paying nothing. Rumpf gave his assistant his first real lessons in economics, teaching him that it was necessary to spend in order to earn. The three young men were sent to different university laboratories, as no place could be found for them in the works. Duisberg went to Fittig's laboratory at Strassburg; history does not tell us what happened—they were very opposite characters. He began work on the synthesis of indigo, without result. He then passed over to the study of azo-dyestuffs from benzidine and made orthotolidine, its next homologue. At the end of a year, in the autumn of 1884, he entered the factory at Elberfeld, never to leave the firm except to translate it from a narrow, confined valley to a great open site at Leverkusen on the banks of the Rhine, securing no mean share of Rheingold treasure by so doing. He rose to gain for the firm a position as high as that attained to by any of its great rivals; moreover, not only to be its head, but also the head of German chemical industry in general: in fact, he became a great man of affairs.

Why is it that, with very few exceptions, our chemists

* Reprinted from “Nature,” with additions by the author.

¹ An adaptation, not a quotation.

insist on remaining public nobodies and play but an underground part in industry? Duisberg was made by his university training, as not a few of his countrymen have been. We cannot point to a single similar success of our ancient universities in constructional industry. Can we doubt that the competitive, superficial, unimaginative training—mere knowledge worship—now given at these, following upon the neglect of all scientific training at our monastic, certificate-hunting public and other schools, is the main cause of our continued failure? Notwithstanding the lesson we have had, our industry to-day is in no way efficiently officered. The Germans have known what *Lern* and *Lehr-freiheit* are—their success has been due to the way in which their universities have been free institutions. Now they are being deprived of them. Freedom is an unknown quantity to-day in our schools: half a dozen examiners control them all and make them pipe to one tune. No experiment can be made. Until and unless we place education under liberal, scientific control, until we displace the clerical type of mind by the practical, no progress will be possible for us. We are doing nothing to develop and cultivate our innately practical intelligence; instead, we are sterilising it by mere book worship. In consequence of our training, our so-called science on the theoretical side is mere faith worship: dogmatic and doctrinal, not eternal doubt; no thought of public need behind it.

A Message from Burton-on-Trent

Duisberg came upon the scene at a propitious time; the fates conspired to help him. It is an interesting fact that his first technical work was inspired by a message from England—from a house-top in Burton-on-Trent, the roof laboratory of the chemist at Allsopp's brewery, Peter Griess, the father of diazo-chemistry and of the azo-dyestuff industry, in virtue of the work he did while assistant to the great Hofmann at the College of Chemistry, Oxford Street, afterwards at Burton-on-Trent, in amplification of the discovery which he had made when a student at Marburg. Griess had submitted proposals to the Bayer firm for the preparation of certain benzidine sulphonic derivatives and their use in making azo-dyestuffs. The task was placed in Duisberg's hands to develop technically. Beginning at Strassburg, he continued the work when he joined the Elberfeld factory in September, 1884. He soon succeeded where others less skilled had failed in preparing Griess's benzidine-sulphone-disulphonic acid and in making from this a dyestuff for wool, *sulphonazurin*, which was patented in their joint names. Although this did not answer expectations, the way was prepared, as the Elberfeld atmosphere became charged with benzidine nuclei.

The Origin of Congo Red

On February 27, 1884, Paul Böttiger, up to the end of 1883 in the employ of the Bayer firm, patented the dyestuff which was to become known as Congo Red, the first dyestuff discovered with which it was possible to dye cotton directly. I have reason to believe that Griess had previously made this and discussed its merits adversely with his friend Heinrich Caro,² a leading member of the great Badische Anilin und Soda Fabrik, who, however, with Dr. Martius, had gained his experience in dyestuff chemistry, in Manchester, with Roberts, Dale and Co. Both the Badische and Duisberg's firm declined to purchase the patent. Böttiger then offered it to Dr. Martius's firm in Berlin. Martius was also about to decline it, when a friend, a dyer, happened to call upon him and noticed the dyed samples upon his desk; being told of its properties, he displayed great interest in the dyestuff on account of its power of dyeing cotton directly.

The Berlin firm secured the patent and soon put the dyestuff upon the market as Congo Red. It excited the greatest interest among dyers, although supersensitive to acids, because of its special behaviour to cotton. Bayers were naturally sore, and it is easy to imagine the chagrin of young Duisberg at having so high a trump taken out of his hand. He at once boasted the Jolly Roger, which was to become the flag of the industry. The dyestuff had two components *A* and *B*. It was open to him to vary either. He chose to vary *A*, benzidine, having already made its first homologue, ortho-tolidine. Here he all but failed to recognise that he

again held trumps. In his first trials he obtained only a brown mess of no promise. He had the habit, however, of putting his beakers aside as he used them, clearing up only at the end of the week. When doing this he noticed that the brown mess had turned into a scarlet. Following up the clue he discovered that the coupling of *A* and *B* took place only very slowly. In thus discovering Benzopurpurin he made the first effective, direct cotton dyeing dyestuff.

A New Field Disclosed

A new field was doubly disclosed—up to that time no systematic use had been made of homologues. On this account, much difficulty was experienced in securing a patent. The Martius firm naturally objected to such a rival to Congo but in the end the two firms agreed to work together. Then a rival firm that had been cited for infringement of the Congo patent brought an action to invalidate the patent. In the end, all opposition was overcome and the patent declared valid largely through Duisberg's own enthusiastic pleadings before the expert court. His value to the firm was greatly enhanced through this. Benzopurpurin, being far less sensitive to acid than Congo Red, was a great commercial success. In the second year of its manufacture, Duisberg's share of the profits was already 10,000 marks (£500), which he at once invested in the firm's shares.³

The effect of Duisberg's success was to stimulate, in an astounding degree, the development of systematic, scientific laboratory inquiry as chief objective of the industry. The Bayer firm, under his enthusiastic guidance, may be said to have led the way. Not only were new dyestuffs produced in endless variety of colour and shade, their use was also systematically studied in the dyeing laboratory. The British dyers became mere tools of the German dyestuff makers, though lubrication with no little palm oil was needed to overcome their intense conservatism and rule of thumb methods.

Duisberg's Luck

Duisberg had no little luck. The opening up of the tetrazo-field involved a great extension of the range of synthetic dyestuff colour. The diazo-colours previously on the market had been yellows and reds; Congo made from aminonaphthalene-sulphonic acid was also red. Substituting naphthol-sulphonic acid for the naphthylamine acid, so increasing the light absorbing power of the dyestuff, Duisberg obtained a blue but of an undesirable red shade. He relates how, sleeping at home after lunch (he had not yet an orchard), he dreamt that if he were to displace the methyl in ortho-tolidine by methoxyl he would introduce a green shade and so obtain a blue akin to indigo. The dream came true. He was beginning subconsciously to theorise about the conditions determining visible colour. Accident was to carry him still further. In manufacturing the dyestuff, large quantities of paranitrophenol were accumulated; this was put into casks and kept for a rainy day. Various attempts were made to find a use for it, without success—until one day the news came that two medical men had been poisoned by a druggist mistakenly dispensing acetanilide for naphthalene. This led to the recognition of the antipyretic value of acetanilide and to its sale by Kalle and Co. as Antifebrin in large quantity. Why not ethylate and reduce paranitrophenol, said Duisberg. He therefore had it converted into ethoxyacetanilide—phenacetin. This proved to be even better than antifebrin.

(To be continued.)

² My belief is confirmed by a statement in the recently issued special number, in memory of Carl Duisberg, of "von Werk zu Werk," the monthly journal of the I. G. Farbenindustrie Aktiengesellschaft.

³ Contrast with this A. G. Green's statement: My board of directors declined in their superior wisdom to apply for any of these suggested patents, which would have covered an enormous field and have been of immense value to the company. By this action and others of a similar character they condemned their firm to continued decadence and to ultimate extinction, whilst at the same time the whole dyestuff industry of England was adversely affected. Who can doubt that had a more enterprising policy been followed the stimulus of successful progress would have reacted advantageously on other English firms and have given encouragement to other English chemists to devote their abilities and energies to dyestuff research. Even when the commercial success of Primuline was assured, my firm declined to make any adequate recognition for the discovery and only under considerable pressure did they consent to pay a small commission. The last payment of this commission, covering the six months preceding my leaving the service of the company, in 1893, amounted to the large sum of 3s. 8d., although the sale of the dyestuff remained undiminished and the average price was then about 2s. 6d. per pound. I only mention these facts to show the small encouragement which was given to young chemists at that period. ("J. Soc. Dyers and Colourists," June, 1917, Vol. XXXIII, No. 6).

The New Duty on Heavy Hydrocarbon Oils

Obligations upon Users of Heavy Oil Vehicles

INFORMATION in regard to the operation of the duty of 8d. per gal. on heavy hydrocarbon oils used as fuel for road vehicles is given in a Customs House notice in the "Board of Trade Journal" of July 18, for the guidance of owners and operators of Diesel and other heavy oil road vehicles and of dealers in oil and others concerned.

So far as users of heavy oil vehicles are concerned, the duty will begin to operate as from August 8. On and after that date it will be illegal to use as fuel in any road vehicle (with certain exceptions) any heavy oil on which duty at 8d. per gal. has not been paid, unless it is shown to be home-produced oil (which is not liable to any duty). "Home-produced" oil means oil produced in this country from coal, shale, peat or any other substance except imported oil.

The duty will apply to heavy oil used as fuel in any kind of vehicle except locomotive ploughing engines, tractors, agricultural tractors and other agricultural engines not used on roads for hauling any objects except their own necessary gear, threshing appliances, farming implements, a living van for the accommodation of persons employed in connection with the vehicle, or supplies of water or fuel required for the purposes of the vehicle or for agricultural purposes; vehicles used for trench digging or any kind of excavating or shovelling work which are used on roads only for that purpose or for the purpose of proceeding to and from the place where they are to be used for that purpose, and when so proceeding neither carry nor haul any load other than such as is necessary for their propulsion or equipment; mowing machines and road rollers. As regards oil used in testing engines, the duty will not be chargeable where an engine is tested in the shops by running on the bench, or otherwise not in a vehicle. On the other hand, once an engine is fitted into a vehicle constructed or adapted for use on roads, any running of the engine, under any circumstances whatever, must be on oil which has paid the duty; this applies even where the engine and vehicle are being tested inside the works or on a private trial ground.

Scope of the Duty

The duty applies solely to heavy oils (other than home-produced oils) used as fuel in road vehicles. It therefore does not apply to lubricating oil, which remains liable to duty at 1d., as previously. On the other hand the 8d. duty applies, not merely to oil used as fuel in Diesel engines, but also to all descriptions of heavy oil (including, *e.g.*, kerosene) used as fuel in road vehicles. It applies whether a heavy oil is the only fuel used, or whether a vehicle is equipped with a bi-fuel carburettor or similar device for starting on light and running on heavy oil. A heavy oil vehicle user may receive heavy oils (whether "imported," *i.e.*, liable to the duty, or home-produced) for use as fuel in heavy oil vehicles only from a licensed dealer. In respect of every consignment of imported or home-produced heavy oils received by him for use as road fuel, a user must obtain from the supplier, and produce on demand to any officer of Customs and Excise, an invoice or certificate. All certified invoices or certificates must be preserved for at least twelve months.

A user's stock of heavy oils (whether imported or home-produced) received for use as road fuel must be kept separate and apart from any other oils, and the tanks or other vessels in which such oils are stored must be marked to the satisfaction of the surveyor of Customs and Excise to enable them to be identified. A user must keep a record of all oils received or obtained, showing the name and address of the supplier, the quantity and description and date of receipt of each quantity received or obtained. He must also keep a record of the use of heavy oils as road fuel, showing each day in respect of each vehicle owned or used by him and ordinarily operated from such premises, the registration mark and number of the vehicle, the quantity of oils supplied to the vehicle and the number of miles travelled on the journey or journeys in respect of which the oils were used. Where a journey is not performed, *e.g.*, where a vehicle is tested or is employed inside a works, goods yard, etc., the nature of such employment is to be shown in the record, in the place of a journey.

The record of the use of heavy oils must include any supplies of fuel which may be obtained by a vehicle during the course of a journey and elsewhere than at the user's own premises, *e.g.*, at a wayside garage.

It will be an offence to use as road fuel heavy oil collected from the drainage of sumps (consisting mainly of lubricating oil), or any other waste heavy oil, the whole of which has not paid duty at the rate of 8d. per gal., unless rebate is first repaid in respect of it (assuming that it is not shown to be home-produced). Any such oil which is used as road fuel after repayment of rebate must be included in the record of the use of heavy oils as road fuel.

Registered owners of heavy oil vehicles who let on hire or lend such vehicles to other users, and who, during the period of such hire or loan, do not supply heavy oils for use in such vehicles, must keep records of the vehicles hired or lent, and furnish to the proper officer particulars of the registered letters and numbers of the vehicles, and of the names and addresses of the persons to whom hired or lent, and of the period for which hired or lent.

Necessary Licences

Every person who sells heavy oils (either imported or home-produced) for use as road fuel must take out a licence for each set of premises from which he supplies such oils. Owners of oils stored in bonded warehouses will require a licence in respect of each warehouse from which they deliver heavy oils on which duty is paid at 8d. per gal. Where duty-paid heavy oils are stocked on premises which include a bonded warehouse, the dealer's licence will be deemed to cover the whole set of premises. Licences will be issued free of charge on application to the collector of Customs and Excise for the collection in which the premises are situated. They will expire on March 31 annually. A licence may on application be transferred to another person on the same premises, or, where the business is *bona fide*, transferred to new premises and discontinued at the old, to the new premises.

Licences need not be held (a) by persons or firms who sell oil in bond only; nor (b) by gas companies, tar distillers and other similar firms who sell tar and other products, but do not sell any such products for use as road fuel. No such firm will be entitled to sell any heavy oil of any description for use as road fuel except under the authority of a licence; any firm which may at any time desire to sell heavy oil as road fuel, even though such a transaction may be outside its usual line of business, should therefore provide itself with a licence.

Stock-keeping Requirements

A dealer's stocks of heavy oil intended for use as road fuel (whether imported and duty-paid at 8d., or home-produced) must be kept separate and apart from any other oils, and the tanks or other vessels in which such oils are stored must be marked to the satisfaction of the surveyor of Customs and Excise to enable them to be identified. A dealer must obtain from his supplier, and produce to any officer of Customs and Excise on demand, a certified invoice, or certificate, for every quantity of heavy oils, whether imported or home-produced, received by him for sale as fuel in heavy oil vehicles. The certified invoice or certificate must show the date of supply, the names and addresses of the supplier and the receiver, and the description and quantity of the oils supplied, and must certify (a) that "no rebate has been allowed in respect of the oils"; (b) that rebate has been allowed and repaid (see paragraph 34); (c) that the oils are home-produced, that they are produced entirely from British coal, shale or peat, or other words to the same effect; or (d) that they are a mixture of imported oils which have paid duty at 8d. and home-produced oils. All certified invoices or certificates received must be preserved for twelve months.

A dealer who supplies heavy oils for use as road fuel, otherwise than by delivery direct from a bonded warehouse, must keep a stock book in a form approved by the surveyor of Customs and Excise. He must enter in the stock book, on the day of receipt or delivery, particulars of all imported and home-produced heavy oils received for sale, or delivered

for use, as road fuel, showing the date of receipt, the quantity and description received, and the name and address of the person from whom the oils were received, and also particulars of all such oils delivered, showing the date of delivery, the quantity and description delivered, and the name and full address of the person to whom the oils were delivered.

From August 1 (inclusive), oil companies and other importers or bonded warehouse-keepers will be at liberty to declare any heavy oil, in the import entry or home consumption warrant, as intended for use as fuel in road vehicles on or after August 8. Where such a declaration is made, no rebate will be allowable, *i.e.*, duty at 8d. will be chargeable. Particulars of heavy oils on which the duty of 8d. per gal. is paid are to be shown separately in the warehouse-keeper's accounts and on home consumption warrants.

Special attention is drawn to the fact that under the law it will be an offence, involving liability to heavy penalties, for any oil company or other firm or person to sell any heavy oils having reason to believe that they will be used in contravention of the prohibition. That is, every seller of heavy oil which (not being home-produced) has only borne the 1d. duty should, in his own interests, take steps to satisfy himself that there is no reason to suppose that the buyer intends to use it as fuel in a road vehicle.

Any oil company or other dealer or any user who at midnight on August 7/8 has in his possession, whether in stock tanks or in the tanks of heavy oil vehicles, any imported heavy oils on which rebate has been allowed (*i.e.*, which have only paid duty at 1d. per gal.), or has such oils in course of transit to him, and who desires to sell such oils for use as road fuel, or to use the oils himself as road fuel, must refund the amount of rebate allowed before such oils may be sold or used for that purpose.

Under statutory regulations officers of Customs and Excise are empowered to enter any premises occupied by a person dealing in hydrocarbon oils, or by any person owning or possessing a heavy oil vehicle, and to inspect any hydrocarbon oils on those premises. Any such person is also under the obligation to produce to any officer any books or documents of whatsoever nature relating to the sale, purchase, receipt or disposal by him of hydrocarbon oils, or the use of any heavy oil vehicle. The statutory regulations further empower officers to examine any heavy oil vehicle and any goods carried thereon, and require a person in charge of any such vehicle to produce any books or documents carried by him or on the vehicle relating to the vehicle or the goods.

If, on or after August 8, any person uses as fuel in a road vehicle any heavy oils which (not being home-produced) have not paid the full duty of 8d. a gal., or sells any such oils, having reason to believe that they will be illegally used as fuel in a road vehicle, or fails to comply with any other provision in the law, or issues a false invoice or certificate, he will be liable either to a penalty equal to three times the value of the oils in respect of which the offence is committed, or to a penalty of £100. Further, the oils will be forfeited to the Crown. The penalty for any breach of the statutory regulations or for obstructing, molesting or hindering an officer in the execution of the powers conferred upon him by the regulations is £100.

Electro-deposition in Industry

An Exhibition at the Science Museum

AN exhibition designed to illustrate all phases of electro-deposition and the scientific principles upon which it is based, opened at the Science Museum, South Kensington, London, on Thursday. It will continue until October. The exhibition has been organised by the Electrodepositors' Technical Society, Northampton Polytechnic Institute, London.

The explanatory principles of electro-deposition are illustrated by working model deposition cells and other exhibits. The section devoted to modern industrial deposition plant includes working models and full-scale plant, some of which is in operation. Examples of decorative and corrosion-resisting deposits are shown. The engineering applications include machine repair and the hard-facing of tools and gauges. Other features relate to the anodic oxidation of aluminium, electro-deposition of rubber, chemical colouring of metals, and electrolytic extraction and refining of metals. During the exhibition there will be daily performances of a cinematograph film illustrating some of the commercial applications of electro-deposition.

The Distillers Company, Ltd.

Chairman Foreshadows his Retirement

PRESIDING at the 58th annual general meeting of the Distillers Co., Ltd., at Edinburgh, on July 19, Mr. William H. Ross (chairman of the company) said a year ago he reported a very large increase in the use of industrial spirit in this country. This increase has been fully maintained during the past year, but no material further increase has taken place. The company has considerable margin for increased production at their existing works, the values of which have been written down to low figures. The margin of profit on this class of business has been kept down to a minimum in order to encourage new and existing industries having alcohol as their basis of production. The yeast trade for the past year has been maintained, but there are indications that since the beginning of 1935 a slight falling off has taken place. Other subsidiary manufactures such as malt extract and "Gyproc" plaster board, which were referred to at the last annual meeting, continue in a healthy condition.

Mr. William Harrison, in moving the re-election of the following directors, *viz.*, Mr. R. W. Preston, Mr. Thomas Wilkinson, Sir James C. Calder, Mr. W. H. Ross, and Lord Forteviot, said they had been long and honourably associated with the Distillers Co. in its progressive and conservative activity, and he accordingly had great pleasure in moving this resolution.

Mr. J. A. Ramage Dawson seconded, and the motion was carried unanimously.

The usual formalities having been completed, the Chairman intimated his desire to resign from the chairmanship of the company and from the board as soon as it was possible for the vacancy to be filled. Mr. Ross said he was taking this step in view of his complete loss of eyesight, and solely on the recommendation of his medical adviser. In October of this year he would have completed fifty-seven years' service with the company.

Vacuum Pan Accident

Danger During De-Scaling Operations

AT the conclusion of a Bootle inquest on Cyril Gedling Prestwich, aged 31, who was killed when the dome of a vacuum pan blew off at the works of the Merton Grove Co., Ltd., Bootle, a verdict of "Death by misadventure" was returned. It was stated that Prestwich was engaged in boring a small hole in the dome of a vacuum pan, preparatory to fitting a gauge, and struck a match to examine the hole. There was a terrific explosion and the dome of the pan went through the roof of the building, carrying Prestwich with it. The pan had been closed down for six days for cleaning and repairs.

William James South, director and secretary of the company, said the pans, of which there were three, were of cast iron, and held about fifty barrels of finished syrup. When the pan was closed down for cleaning and repairs the foreman had instructions to start a scaling wash. After the pans had been steamed out, 1,200 gal. of water were introduced with a quantity of boracic acid. After being boiled for fifteen minutes the liquid was allowed to lay quiescent in the pan, the object being for it to act on the scale formed on the copper steam heating surfaces. "We tested the water in the next pan immediately after this occurrence, and found there was no evidence of acidity," he remarked.

The Coroner: If you had bored a hole in the next pan, and put a light to it, would there have been an explosion?

Witness: Presumably not. We took some of the gas from the top of the next dome and tried it with a flame, but there was no evidence of inflammability.

The Coroner: What caused this explosion?

Witness: We came to the conclusion that it looked like hydrogen, but how it was generated we do not know.

The Coroner: It is not something that could be anticipated?

Witness: No; I have been in pans immediately following washes, and have even smoked cigarettes in them, never dreaming there was any danger.

In reply to a further question as to whether anything was being done to prevent similar cases, witness said the whole of the facts will be placed before the Safety First Committee, and definite rules will be formulated so that nothing like this shall occur again.

Letters to the Editor

Colloidal Clay in Soap

SIR,—We note in the issue of THE CHEMICAL AGE of July 20 a paragraph dealing with the use of colloidal clay in soap, etc. We should like to point out that this company were the original producers of colloidal clay, under the name of "Catalpo." Moreover, we have had an established laboratory conducted by a fully qualified analytical chemist ever since 1924, and a great deal of research work has been carried out with a view to opening up new channels for the use of this most valuable product, we may say, with some success.

We claim that our colloidal clay is at least as good as any which has been put on the market since we first started its production. We think, in fairness to our company, that you should mention the work this company has done with regard to colloidal clay, and state that we were the original producers of colloidal clay under the patents of Catalpo, Ltd.—Yours faithfully,

For THE DARTMOOR CHINA CLAY CO., LTD.,
W. S. CLARKE, General Manager.

Marsh Mills,
Plympton, Devon.

Zinc Corporation, Ltd

Reduced Cost of Recovering Lead and Silver

THE 24th ordinary general meeting of the Zinc Corporation, Ltd., was held in London, on July 23, Sir Robert Horne, M.P., the chairman of the company, presiding. He said the balance-sheet to-day was one of great but not undue strength. For a long time the company's ability to maintain employment was in danger; in fact they were able to continue operations only by realising investments and drawing very heavily on previously accumulated resources. They had to find on working expenditure alone between £50,000 and £60,000 a month. They are to-day spending £100,000 on a new mill.

The results of the work carried out during the year in the Pilot Unit have led to a very satisfactory system, whereby improved recoveries of lead and silver can be obtained at a somewhat reduced cost, compared with the returns from the existing mill. Following on the recommendation of the general managers, the conversion of the mill to the new system is well advanced, and should be operating by the end of this year.

Continuing his speech, the chairman said the world is drawing very heavily on its lead and zinc supplies. Probably nearly 200 million tons of ore have been mined and treated in the last fifteen years to meet the world's demand for these metals. If consumption be maintained at its present level for the next ten years and 150,000,000 tons of ore are thus consumed, many of the major deposits, geographically well placed and now being worked, will be seriously depleted, but, fortunately for the company, there is no reason to fear any shortage of ore in their own property.

The retiring directors, Sir Robert Horne, M.P., and Capt. Oliver Lyttelton, D.S.O., M.C., were re-elected.

Chemical Matters in Parliament

University Graduates and Manufacture of Poisons

IN the House of Commons on July 17 Sir E. Graham-Little asked the Home Secretary whether, in view of the hardship caused by the exclusion of university students in chemistry, unless they are or become members or associates of the Institute of Chemistry, from the list of persons authorised to undertake or supervise the manufacture of pharmaceutical preparations containing any poison used in the internal treatment of human ailments, he would instruct his Department to add to the categories of persons so authorised (Report of the Poisons Board, Cmd. 4192, Appendix II, Rule 27) persons qualified by the possession of degrees testifying competency in chemistry, issued by accredited universities, without being required to seek membership of the Institute of Chemistry.

Sir J. Simon, in reply, said notice of his intention to make rules under the Pharmacy and Poisons Act, 1933, including the rule to which the hon. Member referred, had been published in accordance with the Rules Publication Act, 1893, and he would not be in a position to take any final decisions until after the expiration of the period during which the draft rules were open for representations to be made to him.

Britain's Production of Motor Spirit

In the House of Lords on July 23 the Duke of Montrose questioned the Government regarding the production of petrol in this country, and said that results up to the present were disappointing, as we produced only one-third of 1 per cent. of the national requirements. It was a matter of grave concern that the defence of the country should be almost wholly dependent on overseas supplies.

The Earl of Munster, replying for the Government, said the number of low-temperature carbonisation plants in operation in 1934 was nine, the same as in 1933. The quantity of crude spirit obtained from these plants was 741,000 gal. in 1933, as compared with 767,000 gal. in 1934. These low-temperature carbonisation plants provided only a very small proportion of the motor spirit produced in this country. Up to the present, the main sources of supply had been coke-ovens, gasworks and the shale-oil industry, and there had been a material increase in supplies during the last year or two. There should be a much larger increase in the immediate future when the Billingham hydrogenation plant came into full operation. The output in the years 1931 to 1934 inclusive was 38 million, 39 million, 45 million and 52 million gal. respectively.

Personal Notes

COLONEL R. CHADWICK, managing director of the Clyde Paper Co., Ltd., Rutherglen, is at present on a visit to Finland.

MR. J. A. HUGILL has been appointed secretary of the Calico Printers' Association in place of the late Mr. J. E. Clement.

MR. REGINALD GEORGE MARIOS DELPECH, of 1 Albemarle Street, W., founder and sales director of the Triplex Safety Glass Co., Ltd., left £9,876.

MR. MATTHEW HENRY STILES, of 10 Avenue Road, Doncaster, Yorkshire, retired pharmaceutical chemist, a Fellow of the Royal Microscopical Society, left £28,594, with net personalty £27,597.

MR. ARTHUR HUBERT SANDERSON, of Woodside, Weaponness Park, Scarborough, Yorks, a director of A. Sanderson and Co., Ltd., colour manufacturers, of Hull, who died on May 28 last, left estate of the gross value of £119,434, with net personalty £114,458.

DR. R. M. BARRER, New Zealand, has been elected to a Major Research Studentship of £250 a year for two years, for chemistry, at Clare College, Cambridge. MR. E. S. BRIDSON JONES, St. Bees School, has been elected to a Minor Research Studentship of £150 a year for two years, for chemistry, at the same College.

MR. WILLIAM H. ROSS, the chairman of the Distillers Co., Ltd., announced, at the annual meeting of the company last week, his desire to resign from his position as soon as possible. He said he was taking the step in view of his complete loss of eyesight and solely on the recommendation of his medical advisers. By October this year he would have completed fifty-seven years' service with the company.

MISS ALTA FRANCES THOMPSON, daughter of Alderman Edwin Thompson, past president of the Society of Chemical Industry, and Mrs. Thompson, has taken her medical degree at Edinburgh University. She has also been awarded the Sir Robert Jones prize in orthopaedic surgery and the Pattison prize in clinical surgery. Miss Thompson is 24 years of age and is shortly to take up a position as resident house surgeon at Glasgow Sick Children's Hospital.

MR. MAURICE F. P. LUBBOCK, managing director of Dent, Allcroft and Co., Ltd. (representing the Wholesale Textile Association), MR. S. B. J. SNOXELL, director of Baxter, Hart and Co., Ltd. (representing the London and Luton Bleachers' and Dyers' Association), and MR. J. B. GRAHAM (representing the National Federation of Associated Paint, Colour and Varnish Manufacturers of the United Kingdom) have been appointed to the board of management of the British Colour Council.

News from the Allied Industries

Beet Sugar

ADVANCES MADE BY THE GOVERNMENT to sugar manufacturers under the British Sugar Industry Assistance Act, 1931, are not assessable for income tax purposes. This decision was reached by Mr. Justice Finlay in the King's Bench Division on July 19 on an appeal by the Crown from a decision of the Special Commissioners for income tax purposes that subsidy advances made under the Act to the Lincolnshire Sugar Co., Ltd., were in the nature of loans and not assessable.

Tanning

TWO MORE LEATHER FACTORIES have been established in the Irish Free State—a kip-dressing factory by Wm. Barker and Sons, Ltd., and a chrome side tannery by Stimpson Bros., Ltd., of Northampton. The chrome tanning liquor requirements of different tanneries and leather-dressing works have increased to such an extent that most users find that they are compelled to buy them ready made. The consumption has increased rapidly during the last three years. Not only are cheap by-product chrome liquors easily disposed of, but there is a considerable demand for the chrome extract specially manufactured for the purpose.

China Clay

PRESIDING AT THE 6TH ANNUAL GENERAL MEETING of Lovering China Clays, Ltd., Mr. John Lawson, the chairman of the company, said the whole of the company's profits will continue to be distributed to debenture holders until all arrears of interest and amortisation have been satisfied. This will doubtless lead someone to expect an opinion from the board

as to the likelihood of meeting the full debenture service at an early date. It was estimated that a dividend of 3 per cent. on the company's holding of ordinary shares in English Clays, Lovering, Pochin and Co., Ltd., together with the preference dividend payable by that company, and the revenue arising from the Meloder Estate, would suffice to meet the full debenture service.

Dyeing and Finishing

THE FEDERATION OF UNIONS in the bleaching, dyeing finishing and calico printing trade passed a resolution at Bradford on July 22 approving the ratification of the agreement reached with the employers on the subject of wages in industry. The agreement provides for an immediate advance to be paid to Yorkshire male time-workers of 2s. 2d. a week of forty-eight hours and for women of 2s. 7d., while the Lancashire male time-workers would get an advance of 2s. 5d. (process workers) and 3s. 11d. for non-process workers.

Cement

FOLLOWING NEGOTIATIONS WHICH HAVE BEEN PROCEEDING for more than a year with the object of forming a propaganda organisation for the cement trade, the Concrete and Cement Association has been formed. The new association is affiliated to the Cement Manufacturers' Federation, and will give its entire attention to questions of publicity, marketing and research. An association working on similar lines has already achieved great success in the United States. The expenses of the association will be derived from a central fund, to which all members will subscribe on the basis of output, under an agreement extending over five years.

Continental Chemical Notes

Esthonia

A CONCESSION HAS BEEN GRANTED for building a small caustic soda and calcium chloride factory.

Russia

EXPERIMENTAL WORK ON THE SYNTHESIS OF FORMALDEHYDE from natural gas has been satisfactorily concluded and will be followed by erection of a large plant in due course.

Roumania

THE OIL REFINING CONCERN, Steaua Romana, reports a loss of 6 million len on the 1934 trading (against profit of 52 million len), but dividend is unchanged at 5 per cent.

Turkey

A CONCESSION HAS BEEN GRANTED for exploiting a large molybdenum deposit at Vilayet Angora.

A NAPHTHALENE SHORTAGE has ensued (reports "Die Chemische Industrie") after importations from the principal supplying country (Belgium) had ceased owing to currency difficulties.

Switzerland

SECONDARY ORGANIC BASES or their salts are claimed to be exceptionally suitable catalysts in the preparation of unsaturated aliphatic aldehydes. Not only are the yields considerably improved, but straightforward distillation suffices for final purification. Salts of secondary bases with acetic acid are reported to be exceptionally effective, and the reaction is preferably carried out in the presence of an inert solvent. Conversion of propionic aldehyde into methyl pentenal is cited in illustration of the process, 100 parts of the aldehyde being mixed with 2 parts of piperidine acetate when spontaneous reaction occurs. The mixture is then heated on a water bath for 3 hours under a reflux condenser. After allowing to cool, water of reaction is separated off and the residue is distilled when an 86 per cent. yield of methyl pentenal boiling at 133 to 136° C. (732 mm. Hg.) is obtained (Swiss Pat. 173,737).

Denmark

THE PRODUCTION OF SYNTHETIC ORGANIC CHEMICALS is contemplated by the firm of Sadolin and Holmblad A.S., Copenhagen.

Germany

A NET PROFIT OF 241,000 MARKS on last year's trading was achieved by Deutsche Hydrierwerke A.G., and a 6 per cent. dividend is again distributed. Home sales increased by 20 per cent., but exports dropped in value by 18 per cent. although the actual volume of exports was maintained at the previous year's level.

Ointment for Preventing Industrial Skin Diseases

SCIENTIFIC investigation in recent years has called attention to the urgent need for a preparation which can be adopted in every works to counteract the effects on the skin of mineral oils, spirits and other agents which the Manchester Committee on Cancer and the British Empire Cancer Campaign have proved are the prevalent causes of industrial skin diseases. "Crodol" ointment, supplied by Croda, Ltd., is made to the formula recommended by these bodies. It is sold in convenient works drums at a price which enables every firm to adopt it for the protection of their staff. This "Crodol" is applied to the skin before commencing work. At the end of the day, after thoroughly washing in soap and water, a further quantity of the ointment is rubbed into the affected parts. The lanoline content of the ointment makes it wonderfully penetrative and it is very rapidly absorbed by the skin. In instances, therefore, where it is inconvenient for employees to work with even the small amount of grease that is left on the hands, the ointment should be applied about one minute before commencing work and then the surplus may be wiped off. "Crodol" restores the fat and keratin contents of the skin, a deficiency of which is the cause of dermatitis. It is, therefore, essential that applications of the ointment are made regularly if the maximum benefit is to be obtained.

Chemical and Allied Stocks and Shares

Current Quotations

The following table shows this week's Stock Exchange quotations of chemical and allied stocks and shares compared with those of last week. Except where otherwise shown the shares are of £1 denomination.

Name.	July 23.	July 16	Name.	July 23.	July 16
Anglo-Iranian Oil Co., Ltd. Ord.	60/-	60/-	English Velvet & Cord Dyers' Association, Ltd. Ord.	5/-	5/-
" 8% Cum. Pref.	36/3	36/3	" 5% Cum. Pref.	8/1½	8/1½
" 9% Cum. Pref.	37/6	37/6	" 4% First Mort. Deb. Red. (£100)	£70	£65
Associated Dyers and Cleaners, Ltd. Ord.	1/10½	1/10½	Fison, Packard & Prentice, Ltd. Ord.	38/9	38/9
" 6½% Cum. Pref.	4/4½	4/8½	" 7% Non-Cum. Pref.	30/-	30/-
Associated Portland Cement Manufacturers, Ltd. Ord.	55/6	56/6	" 4½% Debs. (Reg.) Red. (£100)	£106	£106
" 5½% Cum. Pref.	27/-	27/-	Gas Light & Coke Co. Ord.	28/3	28/3
Benzol & By-Products, Ltd. 6% Cum. Part Pref.	2/6	2/6	" 3½% Maximum Stock (£100) ...	£90/10/-	£90/10/-
Berger (Lewis) & Sons, Ltd. Ord.	61/3	61/3	" 4% Consolidated Pref. Stock (£100)	£109/10/-	£109/10/-
Bleachers' Association, Ltd. Ord.	6/-	6/-	" 3% Consolidated Deb. Stock, Irred. (£100)	£90/10/-	£90/10/-
" 5½% Cum. Pref.	9/4½	9/4½	" 5% Deb. Stock, Red. (£100) ...	£116/10/-	£116/10/-
Boake, A., Roberts & Co., Ltd. 5% Pref. (Cum.)	21/3	21/3	" 4½% Red. Deb. Stock (1960-65) (£100)	£113/10/-	£113/10/-
Boots Pure Drug Co., Ltd. Ord. (5/-) ...	49/3	49/-	Goodlass Wall & Lead Industries, Ltd. Ord. (10/-)	12/6	12/6
Borax Consolidated, Ltd. Pfd. Ord. (£) ...	95/-	95/-	" 7% Prefd. Ord. (10/-)	13/1½	13/1½
" Defd. Ord.	16/3	16/-	" 7% Cum. Pref.	30/-	30/-
" 5½% Cum. Pref. (£10)	£11/2/6	£11/2/6	Gossage, William, & Sons, Ltd. 5% 1st Cum. Pref.	24/4½	24/4½
" 4½% Deb. (1st Mort.) Red. (£100)	£109	£109	" 6½% Cum. Pref.	30/-	30/-
" 4½% 2nd Mort. Deb. Red. (£100)	£104	£104	Imperial Chemical Industries, Ltd. Ord. ...	35/3	35/6
Bradford Dyers' Association, Ltd. Ord. ...	9/4½	9/4½	" Deferred (10/-)	8/9	8/10½
" 5% Cum. Pref.	11/10½	11/10½	" 7% Cum. Pref.	33/3	33/6
" 4% 1st Mort. Perp. Deb. (£100)	£84/10/-	£84/10/-	Imperial Smelting Corporation, Ltd. Ord.	13/6	13/9
British Celanese, Ltd. 7% 1st Cum. Pref.	27/-	27/3	" 6% Pref. (Cum.)	22/6	23/9
" 7½% Part. 2nd Cum. Pref. ...	22/6	22/-	International Nickel Co. of Canada, Ltd. Cum.	\$27½	\$27½
British Cotton & Wool Dyers' Association Ltd. Ord. (5/-)	5/-	5/-	Johnson, Matthey & Co., Ltd. 5% Cum. Pref. (£5)	95/-	95/-
" 4% 1st Mort. Deb. Red. (£100)	£91	£91	" 4% Mort. Deb. Red. (£100)	£98/10/-	£98/10/-
British Cyanides Co., Ltd. Ord. (2/-)	3/3	3/3	Laporte, B., Ltd. Ord.	107/6	107/6
British Drug Houses, Ltd. Ord.	20/-	20/-	Lawes Chemical Manure Co., Ltd. Ord. (1/-)	5/7½	5/7½
" 5% Cum. Pref.	22/6	22/6	" 7% Non-Cum. Part Pref. (10/-)	10/-	10/-
British Glues and Chemicals, Ltd. Ord. (4/-)	6/-	6/-	Lever Bros. Ltd. 7% Cum. Pref.	32/3	32/6
" 8% Pref. (Cum. and Part.) ...	29/4½	29/4½	" 8% Cum. "A" Pref.	32/3	32/6
British Oil and Cake Mills, Ltd. Cum. Pfd. Ord.	48/9	48/9	" 20% Cum. Prefd. Ord.	77/6	78/1½
" 5½% Cum. Pref.	26/3	26/3	" 5% Cons. Deb. (£100)	£109/10/-	£109/10/-
" 4½% First Mort. Deb. Red. (£100)	£107/10/-	£107/10/-	" 4% Cons. Deb. (£100)	£105	£105
British Oxygen Co., Ltd. Ord.	105/-	115/-	Magadi Soda Co., Ltd. 12½% Pref. Ord. (5/-)	1/3	1/3
" 6½% Cum. Pref.	31/10½	31/10½	" 6% 2nd Pref. (5/-)	6d.	6d.
British Portland Cement Manufacturers, Ltd. Ord.	90/-	90/-	" 6% 1st Debs. (Reg.)	£58	£58
" 6% Cum. Pref.	31/-	31/6	Major & Co., Ltd. Ord. (5/-)	7½d.	7½d.
Bryant & May, Ltd. Pref.	67/6	67/6	" 8% Part. Prefd. Ord. (10/-) ...	9d.	9d.
Burt, Boulton & Haywood, Ltd. Ord. ...	20/-	20/-	" 7½% Cum. Pref.	1/7½	1/10½
" 7% Cum. Pref.	27/6	27/6	Pinchin, Johnson & Co., Ltd. Ord. (10/-)	42/-	42/-
" 6% 1st Mort. Deb. Red. (£100)	£105/10/-	£105/10/-	" 7% Cum. Pref.	33/1½	33/1½
Bush, W. J., & Co., Ltd. 5% Cum. Pref. (£5)	105/-	105/-	Potash Syndicate of Germany (Deutsches Kalisyndikat G.m.b.H.) 7% Gld. Ln. Sr. "A" and "B" Rd.	£70/10/-	£70
" 4% 1st Mort. Deb. Red. (£100)	£96/10/-	£96/10/-	Reckitt & Sons, Ltd. Ord.	115/-	115/-
Calico Printers' Association, Ltd. Ord. ...	11/3	11/3	" 4½% Cum. 1st Pref.	25/-	25/-
" 5% Pref. (Cum.)	17/6	17/6	Salt Union, Ltd. Ord.	41/3	41/3
Cellulose Acetate Silk Co., Ltd. Ord.	10/7½	11/3	" Pref.	46/3	46/3
" Deferred (1/-)	1/10½	1/10½	" 4½ Deb. (£100)	£109/10/-	£109/10/-
Consett Iron Co., Ltd. Ord.	7/3	7/3	South Metropolitan Gas Co., Ord. (£100)	£125/10/-	£125/10/-
" 8% Pref.	25/-	25/-	" 6% Irred. Pref. (£100)	£149/10/-	£149/10/-
" 6% First Deb. stock, Red. (£100)	£105/10/-	£105/10/-	" 4% Pref. (Irred.) (£100)	£108/10/-	£106/10/-
Cooper, McDougall & Robertson, Ltd. Ord.	36/3	36/3	" Perpetual 3% Deb. (£100)	£88/10/-	£88/10/-
" 7% Cum. Pref.	30/-	30/-	" 5% Red. Deb. 1950-60 (£100)	£114/10/-	£114/10/-
Courtaulds, Ltd. Ord.	53/9	55/-	Staveley Coal & Iron Co., Ltd. Ord.	43/9	43/9
" 5% Cum.	26/3	26/3	Stevenson & Howell, Ltd., 6½% Cum. Pref.	26/3	26/3
Crosfield, Joseph, & Sons, Ltd. 5% Cum. Pre-Pref.	25/-	25/-	Triplex Safety Glass Co., Ltd. Ord. (10/-)	66/3	64/4½
" Cum 6% Pref.	28/9	28/9	Unilever, Ltd. Ord.	32/6	32/6
" 6½% Cum. Pref.	30/-	30/-	" 7% Cum. Pref.	29/3	29/9
" 7½% "A" Cum. Pref.	30/7½	30/7½	United Glass Bottle Manufacturers, Ltd. Ord.	39/6	41/-
Distillers Co., Ltd. Ord.	93/-	94/-	" 7½ Cum. Pref.	33/-	33/-
" 6% Pref. Stock Cum.	30/6	31/-	United Molasses Co. Ltd. Ord. (6/8)	19/4½	20/-
Dorman Long & Co., Ltd. Ord.	18/9	19/4½	" 6% Cum. Pref.	23/9	25/-
" Prefd. Ord.	22/6	20/9	United Premier Oil & Cake Co., Ltd. Ord. (5/-)	6/6	6/6
" 6½% Non-Cum. 1st Pref.	21/6	21/6	" 7% Cum. Pref.	23/9	23/9
" 8% Non-Cum. 2nd Pref.	20/-	20/-	" 6% Deb. Red. (£100)	£101	£101
" 4% First Mort. Perp. Deb. (£100)	£102/10/-	£102/10/-			
" 5% 1st Mort. Red. Deb. (£100)	£104	£104			

Weekly Prices of British Chemical Products

Review of Current Market Conditions

THERE are no price changes to report in the markets for general heavy chemicals, rubber chemicals, wood distillation products, perfumery chemicals and essential oils. Unless otherwise stated the prices below cover fair quantities net and naked at sellers' works. No prices for nitrogenous fertilisers for the new season have been announced but for July delivery the prices in force for June continue unchanged.

LONDON.—Prices still remain steady with a good general demand. Creosote oil is quoted at about 5d. per gal. f.o.r. in the North, and at about 5½d. per gal. in London. Pitch is quoted at about 35s. per ton f.o.b. East Coast port, for next season's delivery.

MANCHESTER.—Firmness has continued to characterise most sections of the Manchester market for chemical products during the past week, and whilst there has been little or no speculative buying going on users are not hesitating to renew commitments over the next few months as they expire. Forward buying this week

has been on a moderate scale and there has also been a fair volume of business extending over shorter periods. Textile and other classes of chemicals are being affected as regards deliveries in

this district by local holidays, but apart from this factor the position from the point of view of consumption remains satisfactory, and an improving tendency is occasionally reported. Most descriptions of the by-products, including the light distillates, are meeting with no more than a relatively quiet trade, but though the tendency in some cases is easy there has been little actual change in prices on balance.

SCOTLAND.—Business in chemicals has been rather quiet during the week, chiefly on account of the holidays, but prices continue very steady at about previous figures. There are few changes to report, but lead and zinc products are very firm in sympathy with the metal markets. Some special export business and prompt delivery orders of consequence have been executed in Glasgow.

Price Changes

Coal Tar Products.—PYRIDINE, 90/140, 5s. 6d. to 8s. per gal.
Pharmaceutical and Photographic Chemicals.—BISMUTH SALTS: carbonate, 6s. per lb.; citrate, 9s. 3d.; nitrate (cryst), 4s. 3d.; oxide, 10s.; salicylate, 7s. 6d.; subchlorite, 9s. 10d.; subgallate, 7s. 2d.; subnitrate, 5s. 3d.
Intermediates.—*m*-CRESOL, 98/100%, 1s. 11d. per lb.; *p*-CRESOL, 34.5°, 1s. 9d.

All other prices remain unchanged.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech., 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech., glacial, £52.

ACID, BORIC.—Commercial granulated, £25 10s. per ton; crystal, £26 10s.; powdered, £27 10s.; extra finely powdered, £29 10s. packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. SCOTLAND: Crystals £26 10s.; powder, £27 10s.

ACID, CHROMIC.—10½d. per lb., less 5%, d/d U.K.

ACID, CITRIC.—11½d. per lb., less 5%. MANCHESTER: 11½d. SCOTLAND: 11½d.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £40 to £45 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works. full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £54 10s. ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. SCOTLAND: 1s. 0½d. less 5%. MANCHESTER: 1s. 0½d. per lb.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d

AMMONIUM BICARBONATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE. SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Sal ammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Sal ammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £34 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 3d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £22 to £23, ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—LONDON: £10 10s. per ton. SCOTLAND: £10 10s. to £10 15s.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%, £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 to £9 5s.

BORAX, COMMERCIAL.—Granulated, £14 10s. per ton; crystal, £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots.

CADMIUM SULPHIDE.—3s. 4d. to 3s. 8d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3½d. to 4½d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10½d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb.; liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 16s. 6d. net.

DINITROTOLUENE.—60/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £25 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 6s. 3d. to 8s. 4d. per lb.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £35; brown, £32 10s.

LEAD NITRATE.—£28 to £29 per ton.

LEAD, RED.—SCOTLAND: £24 to £26 per ton less 2½%; d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £36 10s.

LITHOPONE.—LONDON: 30%, £16 to £17 per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—6½d. to 7½d. per lb. to December 31.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £36 to £38.

POTASSIUM BICARBONATE.—Crystals and Granular, 5d. per lb. less 5% d/d U.K. Discount according to quantity. Ground, 5½d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99½/100%, powder, £37. MANCHESTER: £38 to £40.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P., 5s. 2d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. crystals, 10d. to 10½d. MANCHESTER: B.P., 11½d. to 1s. POTASSIUM PRUSSIAN.—LONDON: Yellow, 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r in bags.

SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £22. SCOTLAND: £20 15s.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lot less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. basis. SCOTLAND: 4d. delivered buyer's premises with concession for contracts.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 10s. per ton. SCOTLAND: 3¾d. per lb.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10 5s.; photographic, £14 10s.

SODIUM META SILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIAN.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5½d. ex store. MANCHESTER: 5d. to 5½d.

SULPHUR.—£9 15s. to £10 per ton. SCOTLAND: £8 to £9.

SODIUM SILICATE.—140° Tw. Spot £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 2s. 6d.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £14 5s. per ton f.o.b.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 4s. 5d. to 4s. 7d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—11d. to 1s. per lb.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb., 100% d/d buyer's works.

BENZIDINE HCL.—2s. 5d. per lb.

p-CRESOL 34.5° C.—1s. 9d. per lb. in ton lots.

m-CRESOL 98/100%.—1s. 11d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 0½d.

DINITROCHLOROBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.

o-NITRANILINE.—3ss. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb., d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5d. per lb.: 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—9½d. to 11d. per lb. p-TOLUIDINE.—1s. 11d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £9. Grey, £12 to £14. Liquor, brown, 30° Tw., 8d. per gal. MANCHESTER: Brown, £11; grey, £13 10s.

ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.

CHARCOAL.—£5 to £10 per ton.

WOOD CREOSOTE.—Unrefined, 3d. to 1s. 6d. per gal.

WOOD NAPHTHA, MISCIBLE.—2s. 6d. to 3s. 6d. per gal.; solvent,

3s. 3d. to 4s. 3d. per gal.

WOOD TAR.—£2 to £4 per ton.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 6¾d. to 8½d. per lb.; crude, 60's, 1s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 7½d. to 7¾d. per lb.; crude, 2s. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale 98%, 1s. 5d. to 1s. 6d.; according to specification. LONDON: 98/100%, 1s. 4d.; dark, 95/97%, 1s. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 3½d. SCOTLAND: Motor, 1s. 6½d.

CREOSOTE.—B.S.I. Specification standard, 6d. per gal. f.o.r. Home, 3½d. d/d. LONDON: 4½d. f.o.r. North; 5d. London. MANCHESTER: 5½d. to 5¾d. SCOTLAND: Specification oils, 4d.; washed oil, 4½d. to 4¾d.; light, 4½d.; heavy, 4½d. to 4¾d.

NAPHTHA.—Solvent, 90/100%, 1s. 5d. to 1s. 6d. per gal.; 95/100%, 1s. 6d.; 99%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4½d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/100%, 1s. 3d. to 1s. 3½d.; 90/100%, 11d. to 1s. 2d.

NAPHTHALENE.—Purified crystals, £10 per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PITCH.—Medium soft, 35s. per ton. LONDON: 35s. per ton, f.o.b. East Coast port. MANCHESTER: 34s. f.o.b. East Coast.

PYRIDINE.—90/140, 5s. 6d. to 8s. per gal.; 90/180, 2s. 3d.

TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 2d.

XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 1d. to 2s. 2d.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—£7 5s. per ton; for neutral quality basis 20.6% nitrogen delivered in 6-ton lots to farmer's nearest station.

CYANAMIDE.—£7 5s. per ton delivered in 4-ton lots to farmer's nearest station.

NITRATE OF SODA.—£7 12s. 6d. per ton for delivery in 6-ton lots, carriage paid to farmer's nearest station for material basis 15.5% or 16% nitrogen.

NITRO-CHALK.—£7 5s. per ton in 6-ton lots carriage paid for material basis 15.5% nitrogen.

CONCENTRATED COMPLETE FERTILISERS.—£10 5s. to £10 17s. 6d. per ton according to percentage of constituents, for delivery in 6-ton lots carriage paid.

NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton.

Latest Oil Prices

LONDON, July 24.—LINSEED OIL was steady. Spot, 23s. 15s. per ton (small quantities); Aug., £21 7s. 6d.; Sept.-Dec. also £21 17s. 6d.; Jan.-April, £21 10s., naked. SOYA BEAN OIL was steady. Oriental (bulk), July-Aug. shipment, £18 per ton. RAPE OIL was steady. Crude extracted, £31 per ton; technical refined, £32 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £23 10s. per ton; refined common edible, £27, and deodorised £29, naked, ex mill (small lots £1 10s. extra). TURPENTINE was steady. American, spot, 43s. 3d. per cwt.

HULL.—LINSEED OIL.—Spot, quoted £22 2s. 6d. per ton; July, £21 12s. 6d.; Aug., £21 10s.; Sept.-Dec., £21 7s. 6d.; Jan.-April, £21 12s. 6d. COTTON OIL, Egyptian crude, spot, £24 per ton; edible refined, spot, £27; technical, spot, £27; deodorised, £29, naked. PALM KERNEL OIL, crude, f.m.q., spot, £18 10s. per ton, naked. GROUNDNUT OIL, extracted, spot, £30 10s. per ton; deodorised, £33 10s. RAPE OIL, extracted, spot, £30 per ton; refined, £31 10s. SOYA OIL, extracted, spot, £22 per ton; deodorised, £25. CASTOR OIL, Pharmaceutical, 41s. per cwt.; first, 36s.; second, 33s. COD OIL, f.o.r. or f.a.s., 25s. per cwt. in barrels. TURPENTINE, American, spot, 45s. 3d. per cwt.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications Open to Public Inspection

ORGANIC COMPOUNDS, manufacture.—British Celanese, Ltd. Dec. 22, 1933. 36815/34.
BASIC PRODUCTS FROM SACCHARIDES, manufacture.—I. G. Farbenindustrie. Dec. 23, 1933. 36832/34.
1:4:5:8-NAPHTHALENE-TETRACARBOXYLIC-ACID, manufacture.—I. G. Farbenindustrie. Dec. 22, 1933. 36833/34.
TEXTILE TREATING BATHS, manufacture and use.—Deutsche Hydrierwerke A.G. Dec. 22, 1933. 36865/34.
PREGNANOLONES, production.—Schering-Kahlbaum A.-G. Dec. 23, 1933. 36976/34, 36977/34.
KETO CYCLOPENTANO-DIMETHYL - TETRADECALHYDRO - PHENANTHROL, production.—Schering-Kahlbaum A.-G. Dec. 23, 1933. 36979/34.
AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Nov. 25, 1933. 17999/35.
LUBRICATING AND LIKE OILS and greases.—Standard Oil Development Co. Dec. 27, 1933. 22667/34.
CELLULOSE ETHER COMPOSITIONS.—Du Pont Viscoid Co. Dec. 28, 1933. 32931/34.
MORDANT DYESTUFFS, manufacture.—Durand and Huguenin A.-G. Dec. 27, 1933. 37073/34.
WOOL-LIKE ARTIFICIAL FIBRES, manufacture.—I. G. Farbenindustrie. Dec. 29, 1933. 37197/34.
COMPOSITIONS FOR APPLICATION to the human skin.—U. S. Industrial Alcohol Co. Dec. 30, 1933. 37336/34.
SOLIDIFICATION OF MOLTEN MATERIALS.—Imperial Chemical Industries, Ltd. Dec. 30, 1933. 37409/34.
PHTHALIC ANHYDRIDE RECOVERY.—National Aniline and Chemical Co., Inc. Dec. 29, 1933. 37416/34.

Specifications Accepted with Date of Application

HYDROABIETYL ALCOHOLS and their manufacture.—E. I. du Pont de Nemours and Co. Dec. 21, 1932. 430,578.
DYESTUFFS OF THE BENZANTHRONE SERIES, manufacture.—E. I. du Pont de Nemours and Co. Dec. 27, 1932. 430,665.
AZO COMPOUNDS, manufacture.—I. G. Farbenindustrie. Dec. 24, 1932. 430,580.
VINYL ETHERS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie. Feb. 10, 1934. 430,590.
DEOXIDATION AND PURIFICATION OF COPPER.—Soc. D'Electro-Chimie, D'Electro-Metallurgie, et des Acieries Electriques D'Ugine. March 13, 1933. 430,526.
SUBSTANTIVE DYESTUFFS, manufacture.—I. G. Farbenindustrie. April 13, 1933. 430,596.
MIXED FERTILISERS CONTAINING LIME, manufacture and production.—I. G. Farbenindustrie. May 10, 1933. 430,380.
REFINING VEGETABLE AND ANIMAL OILS and fats and more particularly for the recovery of solvents used in such refining process.—Metalges A.-G. Feb. 15, 1934. 430,381.
CHLORAL AND BROMAL DERIVATIVES, production.—J. Gaathaug. June 12, 1934. 430,608.
REMOVAL OF IRON FROM SOLUTIONS of aluminium sulphate.—W. W. Groves (Merrimac Chemical Co.). June 18, 1934. 430,384.
NITROSYL CHLORIDE, decomposition.—Kali-Forschungs-Anstalt Ges. Aug. 5, 1933. 430,386.
AZO DYESTUFFS insoluble in water, process for the manufacture. Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Réunies Etablissements Kuhlmann. Aug. 10, 1933. 430,614.
CONCENTRATED CASEIN, process of preparing.—W. W. Triggs (Kraft-Phenix Cheese Corporation). Aug. 17, 1934. 430,617.
OLIGODYNAMIC TREATMENT OF LIQUIDS, apparatus.—Katadyn A.-G. Oct. 16, 1933. 430,635.
ALKYLATED 5:5-KHENYL-ETHYLHYDANTOINS, manufacture.—Chemical Works, formerly Sandoz. Dec. 15, 1933. 430,473.
OILS WITH A LOW PARAFFIN WAX CONTENT, process for the manufacture.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 25, 1934. 430,485.
CELLULOSE ESTERS of dicarboxylic acid and compositions containing these esters.—Kodak, Ltd. Sept. 10, 1932. 430,409.
CHLORINATED RUBBER, manufacture.—F. P. Leach, W. D. Spencer, and Imperial Chemical Industries, Ltd. Dec. 20, 1933. 430,906.
ALUMINIUM-MAGNESIUM ALLOYS.—I. G. Farbenindustrie. Dec. 24, 1932. 431,054.
BENZANTHRONE SERIES, manufacture of compounds.—E. I. du Pont de Nemours and Co. Dec. 27, 1932. 430,914.
BITUMINOUS EMULSIONS, manufacture.—W. W. Groves (I. G. Farbenindustrie). Dec. 27, 1933. 430,917.

DELUSTRED ARTIFICIAL SILKS.—Imperial Chemical Industries, Ltd., and H. D. Mulford. Dec. 28, 1933. 430,993.
ORGANIC CYANOGEN COMPOUNDS and their application.—Grasselli Chemical Co. Dec. 29, 1932. 431,064.
LUBRICATION OILS, treatment.—C. C. Wakefield and Co., Ltd., and E. A. Evans. Dec. 30, 1933. 431,066.
OILING TEXTILE FIBRES, process.—I. G. Farbenindustrie. Dec. 31, 1932. 431,073.
MANGANESE DIOXIDE, manufacture.—L. S. E. Ellis (Soc. des Usines Chimiques Rhone-Poulenc). Jan. 12, 1934. 430,832.
AZO DYESTUFFS and derivatives thereof, manufacture and application.—Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Réunies Etablissements Kuhlmann. April 19, 1933. 430,926.

Applications for Patents

(July 4 to 10 inclusive.)

COMPOUNDING MATERIAL for manufacture of rubber.—Amalgated Oxides, Ltd. 19219.
TITANIUM DIOXIDE, making.—American Zinc, Lead and Smelting Co. (United States, July 12, '34.) 19222.
CONDENSATION PRODUCTS, etc., production.—A. E. Battye, J. T. Marsh, J. Tankard, Tootal Broadhurst Lee Co., Ltd., and W. H. Watson. 19350.
COLLOIDAL SILICIO ACID for water glass, manufacture.—E. Berl. 19233.
PROCESS FOR SULPHUR REDUCTION from pyrite, etc., sulphides.—P. E. Billingham. 19407.
PROCESS FOR THE REDUCTION of beryllium, etc.—P. E. Billingham. 19533.
FERRO-TITANIUM ALLOYS.—British Cast Iron Research Association, A. L. Norbury and P. H. Shotton. 19689.
REGULATING THE HYDROGEN ION CONCENTRATION of fermentation mashes.—W. A. Burton (Commercial Solvents Corporation). 19109, 19110, 19111, 19112.
PROCESS FOR IMPROVING the fastness of dyeings.—A. Carpmal (I. G. Farbenindustrie). 19311.
CONDENSATION PRODUCTS containing nitrogen, manufacture.—A. Carpmal (I. G. Farbenindustrie). 19365.
KETONES, manufacture.—A. Carpmal (I. G. Farbenindustrie). 19743.
ALCOHOLS, manufacture.—Chemical Works, formerly Sandoz. (Switzerland, July 7, '34.) 19267.
NUCLEUS-SUBSTITUTED ALIPHATIC-AROMATIC SULPHONIC ACIDS, producing.—Chemische Fabrik R. Baumheier. (Germany, Jan. 23.) 19620.
AZO DYESTUFFS, manufacture.—Deutsche Hydrierwerke. (Germany, Feb. 7, '33.) (Feb. 7, '34.) 19156.
VULCANISATION OF RUBBER.—E. I. du Pont de Nemours and Co. 19141.
SYNTHETIC RESINS.—E. I. du Pont de Nemours and Co. (March 21, '34.) (United States, March 21, '33.) 19654, 19655.
DRYING OIL FATTY ACIDS, polymerisation.—E. W. Fawcett, R. O. Gibson and Imperial Chemical Industries, Ltd. 19512.
NATURAL WAXES, refining.—E. W. Fawcett and Imperial Chemical Industries, Ltd. 19762.
INSECTICIDAL PRODUCTS, manufacture.—E. W. Fawcett and Imperial Chemical Industries, Ltd. 19763.
VAT DYESTUFFS, manufacture.—I. G. Farbenindustrie. (Germany, July 4, '34.) 19139.
AMINO-ALCOHOLS, manufacture.—I. G. Farbenindustrie. (Germany, July 5, '34.) 19270.
LACQUERS, etc., manufacture.—I. G. Farbenindustrie. (Germany, July 6, '34.) 19271.
DEGREASING METAL, etc., ARTICLES.—Imperial Chemical Industries, Ltd. 19280.
COLOURING MATTER, manufacture.—Imperial Chemical Industries, Ltd., and M. Wyler. 19764.
MAGNETISABLE IRON-NICKEL ALLOYS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19460.
HYDROXYALKYLAMINE COMPOUNDS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19461.
PIGMENT DYESTUFFS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19462.
AZO DYESTUFFS, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19463.
RECOVERY OF AROMATIC COMPOUNDS from liquid hydrocarbons. J. Y. Johnson (I. G. Farbenindustrie). 19464.
N-SUBSTITUTED DERIVATIVES of 1,4-diaminoanthraquinone, manufacture.—J. Y. Johnson (I. G. Farbenindustrie). 19465.

From Week to Week

THE TELEPHONE NUMBER of the London office of Robert Jenkins and Co., Ltd., of Rotherham, is now Abbey 6327.

BRITISH OXYGEN CO., LTD., Victoria Station House, London, S.W.1, has increased its nominal capital by the addition of £1,250,000 in £1 shares beyond the registered capital of £2,250,000.

THE NOMINAL CAPITAL of Catalysts, Ltd., 12 Gray's Inn Road, London, W.C.1, has been increased by the addition of £6,000 in £1 ordinary shares beyond the registered capital of £12,000.

THE AMALGAMATION of the British Plaster Board, Ltd., of Wallasey, and Gypsum Mines, Ltd., of Mountfield, Sussex, was unanimously confirmed at an extraordinary general meeting of the British Plaster Board, Ltd., held at Liverpool, on July 23.

IMPERIAL CHEMICAL INDUSTRIES, LTD., has, it is understood, acquired Irvine Docks, on the River Irvine, Ayrshire. The docks, which were owned by a private company, will provide additional loading facilities.

THE DEPARTMENT OF OVERSEAS TRADE announces that arrangements are being made for a portion of the British Industries Fair for 1937 to be housed in the new exhibition buildings which are to be erected at Earl's Court. The remaining portion of the Fair in London will be held as usual at Olympia.

CONSIDERABLE DAMAGE was done on July 19 by an explosion at the Roslin Powder Mills, Midlothian, controlled by Imperial Chemical Industries, Ltd., and owned by Curtis and Harvey, Ltd. An official statement was issued announcing that there had been no casualties.

THE DIRECTORS of HERBERT GREEN AND CO. have informed shareholders that, since the issue of the progress report on March 20 last, the congested conditions prevailing throughout the British engineering industry have further delayed the delivery of some essential units for the refinery, and consequently the production of lubricating oil cannot begin until September. In order to comply with the statutory requirements of the Companies Acts, the annual general meeting will be held towards the end of August, when the accounts to June 30, 1935, will be presented.

THE FIRST PLANT of ITS KIND in the country for the production from British coal of Diesel oil for high-speed road transport engines is about to be erected at the Barugh works of Low Temperature Carbonisation, Ltd., near Barnsley. The new plant is concerned in the first place with the extraction from the oil of the valuable tar acids contained therein and then with the conversion of the remainder of the oil into Diesel oil for high-speed Diesel engines. The contract for the plant has been placed with Simon Carves, Ltd., of Cheadle Heath, Stockport.

SPEAKING AT A LUNCHEON to Dr. E. F. Armstrong, given by the Institute of Industrial Administration in London on July 16, Mr. Harold Macmillan, M.P., said that there was a call for a far higher standard of technical administrative ability than had ever been before. Welcoming Dr. Armstrong, who was chairman of the organisation committee of the International Scientific Management Congress recently held in London, he said that it was too early to assess the results of the Congress of Industry, but he was certain that there would be an increased attention to, and the development of, the training of executives in industrial administration.

DUE TO THE GENERAL IMPROVEMENT IN TRADE, particularly in the manufacture of motor cars and in the general engineering industry throughout the world, and in the constant increase in new uses daily being discovered in alloys of the non-ferrous type, notably those containing nickel and copper, the Mond Nickel Co., Ltd., has now reached a point where it has been decided to extend very materially the productive capacity of the Clydach refinery. When these extensions are completed, further employment will be provided, either directly or indirectly. This is particularly gratifying in an area which, during recent years, has been so badly hit by the general trade depression. During the next six months approximately £150,000 will be spent on new extensions and modernisation of plant, and the ultimate object of the company is to double the refining capacity in Wales, and so keep in step with that of the other refineries owned in Canada by their parent company, the International Nickel Co. of Canada, Ltd.

A REPRESENTATION HAS BEEN MADE to the Board of Trade for the exemption of physical lecture and experimental apparatus of the following descriptions from key industry duty under Section 10 (5) of the Finance Act, 1926:—Glass observation portions of a fractionating column, glass bubble caps, metal bubble caps, and level control device, being parts of apparatus to demonstrate fractional distillation. It is claimed that these articles are not made in any part of the Dominions in quantities which are substantial having regard to the demand for the time being in the United Kingdom, and that there is no reasonable probability that they will within a reasonable period be made in the Dominions in such substantial quantities. Communications should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than August 1.

G. V. D. ILLUMINATORS, LTD., have secured a contract for lighting on the new Cunarder "Queen Mary."

THE WORKS AND WAREHOUSES of Thomas Tyrer and Co., Ltd., Stratford, will be practically closed from July 26 to August 6 for the annual holidays. Only urgent orders, or post orders, will be attended to during that period.

THE WAR DEPARTMENT is to spend £40,000 on the maintenance of an explosives factory at Irvine, Ayrshire, according to the estimates of the Ordnance Department. The factory will be used primarily as a reserve factory; regular manufacture of explosives will only be on a small scale, employing a small number of people.

AT THE WEST OF ENGLAND BANDSMEN'S FESTIVAL, held in the heart of the china clay district at Bugle St. Austell on July 20, St. Dennis China Clay Workers' Band, which had secured the championship on eleven occasions, were unsuccessful, and Munn and Felton's Band from Kettering, Northamptonshire, won the champion awards.

ELEVEN MEN WERE TAKEN TO HOSPITAL suffering from slight burns following an explosion at the Bronley-by-Bow works of the Gas Light and Coke Co., on July 18. After treatment all but one of the men were able to return to the works. An official of the company stated that "with the aid of pickaxes the men were emptying a purifier of iron oxide, which is used to purify gas, when the slight explosion occurred."

THE 27TH ANNUAL AUTUMN MEETING of the Institute of Metals will be held at Newcastle-upon-Tyne, from September 9 to 12, under the chairmanship of Dr. Harold Moore, president of the Institute. The proceedings will begin in the evening of September 9 with the delivery by Dr. H. W. Brownson of a lecture on "Metal Melting—Its Effect on Quality." On September 10 and 11 there will be discussion of a series of scientific papers relating to various phases of metallurgical work.

WHEN THE ROYAL COMMISSION on the Private Manufacture of and Trading in Arms continued its sittings at the Middlesex Guildhall, on July 18, it was stated that a question had been put in regard to the profits of the chemical industry. The union did not suggest for a moment that the industry would encourage war merely to make profits, but the fact remained that during the war the chemical industry did make very large profits. It would be to the advantage of the nation, they thought, that these profits should go to the nation as a whole instead of to private shareholders, which would result in more armaments at a cheaper cost rather than fewer at heavier costs. This matter was brought out in evidence given before the American Commission and reported in the Press last December, showing profits in one case of about 400 per cent., which was certainly excessive.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to August 10, 1935.

Graphidol. 559,023. Class 1. Preparations of graphite for preventing or removing scale in steam boilers. Max Mezger, 2 and 3 Golden Square, London, W.1. March 22, 1935.

Enprädil. 560,756. Class 1. Chemical substances for steeping, colouring and brightening textile fabrics and leather in the course of their manufacture. **Netazym.** 560,757. Class 1. Chemical substances for steeping, colouring and brightening textile fabrics and leather in the course of their manufacture. Bohme Fettchemie-gesellschaft mit beschränkter Haftung, Moritzstrasse 25-33, Chemnitz, Saxony, Germany. June 7, 1935.

Netazym. 560,655. Class 2. Chemical substances used for agricultural, horticultural, veterinary and sanitary purposes. Stafford Allen & Sons, Ltd., 7 Cowper Street, Finsbury, London, E.C.2, and Long Melford, Suffolk. June 4, 1935.

Albanite. 560,486. Class 4. China clay. English Clays Lovering Pochin & Co., Ltd., 14 High Cross Street, St. Austell, Cornwall. May 27, 1935.

Books Received

Experimental Researches and Reports, published by the Department of Glass Technology. The University, Sheffield. Pp. 384. 7s. 6d.

Fortschritte des Chemischen Apparatusens. Elektrische Oefen. Lieferung 4. Leipzig: Akademische Verlagsgesellschaft. Pp. 300. RM.22.

Manchester Chamber of Commerce Official Handbook, 1935. 2s. 6d.
Industrial and Manufacturing Chemistry. Part II. Inorganic. By Geoffrey Martin. London: The Technical Press, Ltd. Pp. 496. 28s.

Company News

Redfern's Rubber Works.—On the ordinary shares a dividend of 2½ per cent., less tax, is payable on August 15, against nil.

British Coal Distillation.—A loss to November 30, 1934, of £8,598, plus £30,860 debit brought in is reported, and £7,288 written off loan and interest due by Leicestershire Colliery and Pipe Co., making £46,746 to go forward.

Lancegaye Safety Glass (1934).—The report for the period March 23, 1934, to March 31 last shows trading profit £6,832; after depreciation expenses, fees, etc., but before tax, balance is £4,027; final dividend 2½ per cent., making 5 per cent., takes £2,111; tax reserve £450, written off preliminary expenses £664, leaving £803 forward.

Major and Co.—For the year to March 31 last, the report shows loss £6,773, against profit £9,657; the debit balance has increased from £1,335 to £8,462. The bank overdraft has been decreased by nearly £40,000. Preference dividends are paid to March 31, 1931; the last ordinary dividend was 10 per cent. for 1929-30.

Solignum Co.—The report for the year to March 31 last shows profit £7,481, against £6,969; deduct £4,000 damages and costs of law action; preference dividend absorbs £4,920; forward £172, (against £1,611 brought in). The last ordinary dividend was 5 per cent. for 1931-32.

W. H. Goulding.—An ordinary dividend at the rate of 6 per cent. per annum (same), and at the rate of 5½ per cent. per annum on the preference for the year ended June 30 last, both payable in two equal instalments on July 31 and December 31 next, less tax. The net profits for the year, subject to audit, are £32,613, against £32,105.

Benn Brothers, Ltd.—A final dividend is announced on the ordinary shares of 10 per cent., making 15 per cent. for the year. This is the same distribution as that made for the previous year. The deferred dividend is also being maintained with a payment of 2s., making 3s. for the year. The half-yearly dividend on the 6 per cent. preference shares is also announced.

Thomas Bolton & Sons, Ltd.—The profits for the year to March 31 are stated to be £130,412, against £88,938 for the previous year and £55,398 for 1932-33. The directors write off £32,000 for depreciation, pay debenture interest amounting to £26,799, and write off the debenture stock issue expenses of £4,810. They further propose a final dividend of 5 per cent., making 7½ per cent. for the year, which will absorb £37,500, and carry forward £15,501, against £13,425 brought in.

Harben's (Viscose Silk Manufacturers).—Trading profits amount to £49,775 for the year to April 30 last, an advance of over £11,000 on the previous year's figure of £38,377. More is provided for maintenance of plant, etc., at £26,934, and £20,000 is again provided for depreciation. After allowing for directors' fees, interest, etc., the amount brought in is reduced from £33,105 to £26,673. No dividends have yet been paid on the ordinary shares, and the first and second preference dividends are paid to April 30, 1930.

Chemical Bank and Trust Company, New York.—Condensed statement of condition at close of business June 29, 1935, shows assets totalling \$563,203,978, comprising cash and due from banks, \$115,413,113; U.S. Government obligations, direct and/or fully guaranteed, \$173,390,229; bankers' acceptances and demand loans, \$74,252,823; eligible papers and short-term notes, \$48,662,034; State and municipal bonds, \$30,525,078; other bonds and investments, \$12,242,872; loans and discounts, \$87,880,544; banking houses owned, \$492,907; other real estate owned, \$6,802,400; mortgages owned, \$5,845,820; credits granted on acceptances, \$5,175,094; other assets, \$2,491,057. On liabilities side appears capital stock, \$20,000,000; surplus, \$40,000,000; undivided profits, \$8,725,062; dividend payable July 1, 1935, \$900,000; reserved: Taxes, interest, etc., \$10,462,265; acceptances outstanding, \$6,568,375 (less

own acceptances held in portfolio), \$988,544 = \$5,579,831; other liabilities, \$1,785,495; deposits, \$475,751,324—total, \$563,203,978.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

Satisfaction

RESEARCH ASSOCIATION OF BRITISH PAINT, COLOUR AND VARNISH MANUFACTURERS, London, W.C. (M.S., 27/7/35.) Satisfaction reg. July 12, £2,000, reg. Mar. 10, 1927.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

SMITH, Ellen Elizabeth, 70 Parkwood Road, Boscombe, married; SMITH, Wm. Leslie Saml., 42 Berkeley Road, Coventry, metallurgical chemist. (C.C., 27/7/35.) £12 11s. 6d. June 4. CARPENTER, C. W. (male), 28 Cedric Road, Crumpsall, chemical manufacturer. (C.C., 27/7/35.) £22 2s. 10d. June 6.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development, and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

South Africa.—H.M. Trade Commissioner at Cape Town reports that the South African Railways and Harbours Administration is calling for tenders, to be presented in Johannesburg by August 12, 1935, for the supply of a 20,000-gallon pressed-steel tank, 20 ft. by 20 ft. by 8 ft. deep, of ½ in. plates, complete with stand 22 ft. high. (Ref. T.Y. 5087.)

Egypt.—The Commercial Secretary to the Residency, Egypt, reports that the Egyptian Irrigation Department is calling for tenders, to be presented in Khartoum by August 15, 1935, for the supply of centrifugal pumping plant and fittings for Malakal Stores. (Ref. T.Y. 5085.)

Mexico.—A firm in Mexico City desire to obtain the agency of a United Kingdom exporter of paraffin wax (125° to 127°). (Ref. No. 99.)

OLEUM (all strengths)

Sulphuric, Battery, Dipping,
Muriatic, Nitric, and Mixed Acids.

SPENCER CHAPMAN & MESSEL Ltd.

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